

Vol. XIV

No. 7

# DISSERTATION

## ABSTRACTS

(formerly MICROFILM ABSTRACTS)

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MONOGRAPHS AVAILABLE IN MICROFORM*

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*A GUIDE TO DISSERTATIONS AND  
MONOGRAPHS AVAILABLE IN MICROFORM*

UNIVERSITY MICROFILMS  
ANN ARBOR, MICHIGAN: 1954



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## AGRICULTURE

### AGRICULTURE, FORESTRY AND WILDLIFE

#### THE RELATIONSHIP BETWEEN LUMBER QUALITY AND CONVERSION COST IN FURNITURE PLANT ROUGH MILLS

(Publication No. 8289)

John Wallis Creighton, Jr., Ph. D.  
University of Michigan, 1954

The hardwood furniture industry should be thoroughly familiar with the lumber characteristics which affect the final cost of its products, and with the relative costs of pieces of various sizes cut from the different lumber grades, and produced by different methods. Information of this type has, heretofore, been available to management in the furniture industry only on an average basis, because methods by which management could determine precise costs of manufacturing cuttings have been lacking.

This study attempts to fill this gap by the development of a method to determine precise cost relationships of deriving cuttings of different sizes from the different lumber grades. Operations in the rough mill departments in three furniture plants were studied, and application of the results was made in a fourth. Time, and direct labor and material cost per net foot required to produce each cutting size from each of four lumber grades were determined.

Results of the study establish the net yield obtained in processing the different lumber grades into various cutting sizes, and the direct labor and material costs incurred. Direct labor cost ratios between the lumber grades were determined to be fairly constant regardless of the cutting length, as were ratios between cutting lengths regardless of grade. From these ratios, indexes were established which relate the direct labor cost of producing each cutting size in each grade to the cost of the twenty-four inch length Number One Common standard. Deviation from the Number One Common twenty-four inch index was found to decrease for other grades and sizes with an increase in plant efficiency. An application of the index system of direct labor cost estimating was made in a fourth furniture plant. In this application, a time study was run to determine the direct labor cost to produce twenty-four inch length cuttings from the Number One Common grade. Direct labor length and grade cost indexes were then applied to this cost to find the costs for other lengths, and for other lumber grades.

The effect upon cost, of cutting requirements which result in incomplete utilization of small sizes is also developed in the study. Results show, that under conditions in which the study was conducted, cuttings derived from the Number One and Number Two Common grades were excessively high in cost

when cuttings below thirty inches in length, or four to five inches in width, could not be completely utilized.

An equation was developed which can be used to determine the lumber grade which will yield cuttings at the lowest unit cost under conditions of varying yield, or of varying lumber cost. This equation, in modified form, may also be used to compare costs of cuttings produced from lumber from different suppliers. 159 pages. \$1.99. MicA54-1483

#### MICHIGAN BEAVER POPULATIONS AS INFLUENCED BY FIRE AND LOGGING

(Publication No. 8329)

William Hobart Lawrence, Ph. D.  
University of Michigan, 1954

The purpose of this study was to investigate the ecological requirements of the beaver in Michigan and to determine the factors controlling local distribution and abundance. Investigators who previously studied this animal have focused their attention on the individual colony, studying beavers only in relation to the spots where they were actually present. The remainder of their environment was largely ignored. However, to understand fully the ecological position of the beaver in the total environment, conditions prevailing both in the unpopulated waters and about active flowages are of equal importance.

The community approach was employed in this study. That is, beavers were studied as an integral part of a forest community. The organization of this research entailed: (1) the selection of a piece of land, in this instance a watershed, representative of the various environmental types and land use practices occurring within the locality; (2) the preparation of a history of land use activities and the study of their effects on the beaver and its environment, and (3) the investigation of the present interrelationship existing between beavers and their environment.

The major results of the study are as follows: (1) Natural catastrophes such as fire, windthrow, and more recently lumbering have played a prominent role in controlling the distribution and abundance of beavers by producing favorable environmental conditions for them. The present peak in the Michigan beaver population, largely a result of fires following pine logging, is not a new phenomenon. Historical records show that peak numbers of beavers have always followed widespread disturbances which destroyed the forest and initiated succession anew. (2) Beavers are primarily a part of the temporary forest type, aspen. This tree in the usual course of succession is replaced by more tolerant species after a single generation. Forest fire suppression, present silvicultural practices, and the tree felling activities



of the beaver itself are aiding in the rapid replacement of the aspen type bordering streams. The current peak in beaver numbers can persist only as long as aspen remains available within approximately five chains from the water's edge. (3) Understanding the ecology of the beaver and its position in the scheme of environmental succession provides a new basis for the management of the species. Management practices must take into account the changes brought about by successional trends and the tree-cutting activities of these animals. If beaver management is to succeed it is necessary that favorable stages in forest succession be maintained in appropriate quantities. The attempt should be not to halt

succession at the desirable stage but rather to integrate beaver management into a forest management program similar in pattern to environmental change which occurs naturally in the aspen-conifer cycle. Management should be on a streamwise basis with some streams producing beavers while others are recovering from beaver occupancy. This approach stands in sharp contrast to the purely arbitrary administrative practices employed today.

Only by clearly understanding the beavers' role in environmental succession can man be successful in the long-time management of this fur-bearer.

232 pages. \$2.90. MicA54-1484

## ANATOMY

### THE CENTRAL TEGMENTAL BUNDLE. AN ANATOMICAL AND EXPERIMENTAL STUDY IN THE MONKEY

(Publication No. 8268)

Jose Bebin, Ph. D.  
University of Michigan, 1954

The anatomy and physiological significance of the central tegmental bundle with special reference to the palatal nystagmus are the object of this study. Stimulation followed by localized lesions of the central tegmental bundle through its course in the tegmentum of the brainstem was produced in monkeys by using the stereotoxic instrument (McCulloch's modification). The material was prepared by the Marchi technique to provide evidence of the localization of the lesions and the course and termination of the bundle studied. The normal microscopic anatomy was studied in serial sections stained by the Weil technique.

The central tegmental bundle is a complex of fibers of varying lengths, partly chains of neurons which constitute a system of fibers linking to some extent, the diencephalic and the mesencephalic centers, and chiefly a group of long fascicles forming a very conspicuous bundle enriched with the mesencephalic components, between the tegmentum of the brainstem and the inferior olive. The most rostral component of the central tegmental bundle comes from the pallidum and the zona incerta where the fibers establish a first synapse and receive new fibers. These run caudalward increasing in fibers from synapses in the mesencephalic periventricular gray, and at the level of the mesencephalic red nucleus are joined by a heavy contingent of rubro-olivary and tegmento-olivary fibers. During its further course, the central tegmental bundle, is joined by fibers from the brachium conjunctivum descendens which arise in the contralateral dentate nucleus of the cerebellum. The combined bundle passes through the tegmentum of the pons and medulla and

ends in the inferior olivary complex, in the central reticular substance, and particularly, in the nucleus ambiguus. A few fibers appear to continue their descending course into the cervical cord with the olivo-spinal fascicles.

The stimulation of the central tegmental bundle in monkey elicited, as its most frequent responses, modifications of the respiratory rhythm and frequency, mainly diminution of the latter with sometimes periods of apnea. Ocular responses were obtained when the stimulation was carried out in areas in the neighborhood of the oculomotor nuclei, likewise facial responses were elicited when the stimulation was in the proximity of the facial nuclei. In most of the experiments movements of the palatal musculature were observed. These consisted of raising and deviation of the uvula, elevation and contraction of the soft palate toward the side stimulated, and sometimes bilaterally. In the latter eventuality a rhythmic contraction of the musculature of the palate similar to the palatal nystagmus seen in human patients was observed, but was short in duration and ceased immediately after cessation of the stimulation. In a very few instances accompanying responses of the skeletal musculature were observed.

The lesions produced in the central tegmental bundle involved partially this system at different levels (tegmentum of the midbrain, tegmentum of the pons, medulla oblongata and its termination in the inferior olive). They also, at times, involved some of the adjacent structures (such as the facial nucleus) thus producing the additional symptoms occasionally observed in the animals. From these lesions no ascending degenerated fibers in the central tegmental bundle were detected in the microscopic material. Clear descending degeneration of the central tegmental bundle was followed into its termination in the capsule as well as in the hilus of the inferior olivary nucleus. Some of these fibers were traced into the dorsal accessory olivary nucleus, adjacent reticular gray and especially the nucleus ambiguus.

On the basis of the experimental and pathoanatomical data available, the central tegmental bundle and the inferior olive appear to assume an important role in the production of palatal nystagmus. Moreover, this syndrome occurs in man each time the inferior olive is affected by a degenerative process "hypertrophy" secondary to a lesion of the central tegmental bundle or dentate nucleus of the cerebellum. A focal destructive lesion of one of these structures such as is seen in clinical cases or on experimental studies in animals reproduce the palatal nystagmus.

Under experimental and clinical conditions irritation or destruction of the central tegmental bundle or the inferior olive disturbs the normal discharge patterns from these centers and produces an imbalance of the entire system resulting in abnormal movements (palatal nystagmus). This may explain why palatal nystagmus appears on the contralateral side of the lesion in the inferior olivary nucleus, and on the ipsilateral side if the lesion is in the dentate nucleus. 82 pages. \$1.03. MicA54-1485

## ANTHROPOLOGY

## THEMATIC VALUES AND UNIVERSAL NORMS

(Publication No. 8239)

Paul Kindred Deats, Jr., Ph. D.  
Boston University School of Theology, 1954

Major Professor: Walter G. Mudder

The central concern of this study is to make explicit a conceptual framework for anthropology that is implicit in the working assumptions of anthropologists. The method involves critical examination of the theory, practice, and empirical data of anthropologists. After tracing the development of anthropology, the study examines the concepts of cultural relativism and thematic values and the possibility of inferring universal norms and discovering categories for cross-cultural comparisons.

Nineteenth century evolutionary theory placed western institutions and beliefs at the top of a scale of progress, with their antitheses at the bottom as "origins," and developmental stages between. Franz Boas led twentieth century reaction to evolutionistic and ethnocentric theory, stressing field investigation and cultural pluralism. The concept of culture emphasized the influence of custom and the plasticity of "human nature," thus opposing racism. From this concept developed that of cultural relativism: the values in any culture can be understood and valued only with reference to the premises and norms of that culture. An important corollary is tolerance.

Cultural relativism is valuable as a method of understanding a culture, but its logical conclusion as philosophy is that no concepts are universally applicable and no standards universally valid. Philosophical relativism is criticized in terms of:

1. Its assumptions: (i) culture as identified with a particular conception of society, assuming too complete integration and ignoring variations within cultures; (ii) each culture as a closed system, implying determinism.

2. Its implications: (i) relativists oppose seeking cultural change but criticize those whose enculturation leads them to seek change; (ii) relativism, held as "true," implies there are no criteria for

"truth;" (iii) relativism, an induction from comparative studies, denies the basis of cross-cultural understanding; (iv) the ultimate appeal is to force in value conflicts.

3. The involvement of anthropologists in practical activities with consequences and implications: tolerance found its limit when tolerated ways of life threatened world order; World War II challenged scientists to commitment to democratic values and against racism.

Anthropologists have been increasingly concerned with values, in the study of implicit culture and of patterning, and in the emergence of the individual from the cultural background. From Morris Opler's concept of "themes" as dynamic forces underlying variations, Ralph Linton developed the concept of "thematic values" which can be abstracted for cross-cultural comparisons. Thematic values include communication, morality, "reasons" for moral codes, religion, family, in-group, and concepts of normality. Suggested categories of "needs," "problems," and "functional prerequisites" fail to explain universal aspects or provide significant comparisons.

The category of purpose provides the most significant clue to the nature of cultural institutions, with patterns understood and compared in terms of what people are trying to do. Anthropological evidence also points to a norm of personality-in-community-made-possible-by-culture. The implicit appeal, even in arguing for relativism, is to such a norm and to an empirical criterion of coherence.

Conclusion: Thematic values empirically discovered by anthropologists point to purposes common to all men and all human societies, which require adequate instrumentation if a society is to remain viable and its members realize their potentialities as human beings. These do not require instrumentation in just one way, nor in just any way, but there are limits. Thus values and norms are relative not only to the background of a culture but also to a universal human nature. It is to the norm of personality that appeal ought to be, and often is, made in resolving value conflicts within the experience of a person, or between members of the same or different societies. The work of anthropologists first



assumes, then progressively makes possible, discovery of universal norms and achievement of an inclusive community.

256 pages. \$3.20. MicA54-1486

**THE EXCAVATION OF MOUND C, OCMULGEE NATIONAL MONUMENT: MACON, GEORGIA**

(Publication No. 8300)

Charles Herron Fairbanks, Ph. D.  
University of Michigan, 1954

The purpose of this study is to report the excavation of a significant unit of the Macon Plateau Focus, Early Mississippi Period, from central Georgia and to indicate its cultural relationships. The site comprises the only burial complex of Early Mississippi so far known in the area. It represents a combination of Temple Mound I and Burial Mound traits suggesting acculturation of the Macon Plateau Focus. The cultural Complex appears to represent the remains of a people who invaded central Georgia and maintained their isolation from the surrounding population for the duration of this particular occupation. This reports the excavations under the supervision of Arthur R. Kelly.

In the main body of the report the mound structure is reported beginning with the sub-mound burials. Burials, pits, mound structures, pottery, and other artifacts are discussed for each stage as a unit. The large sub-mound pits with log tombs containing the bones of from one to seven individuals suggest retainer burial practices as well as reflecting the elaborate tombs of Burial Mound II. The flat summit platforms of each stage evidently contained, originally, important structures. Excavation methods yielded no information on this important point. The post-mound occupation of the area by the historic Creeks is briefly reported.

Following the detailed discussion of the structural stages, the artifactual remains are described,

largely by material complexes. Functional categories, however, are also used. The material here presented is summarized in the trait lists for the Macon Plateau and Ocmulgee Fields phases in an appendix.

The cultural relationships of the Macon Plateau are examined. The related complexes compared are those that, by cultural content or geographic proximity, seem to offer some hope of meaningful information. Complexes with similar mounds and pottery are Norris Basin and Hiwassee Island of Eastern Tennessee. Comparisons are also made with the Bynum Mounds, Kolomoki, Mound C at Etowah, Gahagan Mound, and the Greenhouse Site in Louisiana. At all of these numerous burials were found. Comparisons are also made with the Nacoochee Mound in northern Alabama, which structurally was a quite similar mound. The method of comparison employed is to compare total complexes rather than isolated traits. Where individual traits seem to offer some specific cultural connection they are, however, treated in detail. Comparisons of pottery were also made with the Jonathan Creek Village, and related sites, of northern Kentucky. Evidence is also presented for the relative chronological position of Macon Plateau.

Under "Changes in Life at the Site" the cultural sequence is sketched within the limits imposed by the material. This continuity is interrupted by the Macon Plateau Period but is essentially a gradually expanding economy and gradually evolving cultural pattern.

It is concluded that the Funeral Mound and Macon Plateau is an element of the Early Mississippian Horizon in the southeast. It is most closely related to Hiwassee Island, Norris Basin, and Jonathan Creek. It contains elements of the burial complex found in the Burial Mound I and II stages. It is later than the Mossy Oak and Swift Creek periods. While approximately contemporary with Norris Basin and Hiwassee Island, it seems to be slightly later.

253 pages. \$3.16. MicA54-1487

**BACTERIOLOGY**

**AN INVESTIGATION OF THE PNEUMOCOCCIDAL ACTIVITY OF EXTRACTS OF POLYMORPHONUCLEAR LEUKOCYTES FROM RESISTANT AND SUSCEPTIBLE HOST SPECIES**

(Publication No. 8267)

Michael Frederick Barile, Ph. D.  
University of Michigan, 1954

The guinea pig was found to be a million times more resistant to an intraperitoneal inoculation of *Diplococcus pneumoniae* Type I Strain 76 than was the rat. The investigations undertaken were an attempt to evaluate some of the factors which determine

why a guinea pig will survive and a rat will succumb to a pneumococcal infection. More specifically, these investigations were designed to study the possible role played by leukocytes and their extracts in the defense of a host to a pneumococcal peritonitis.

The inflammatory cellular response of each host to the invading pneumococci was studied. The number of leukocytes in the inflammatory exudate was interpreted as measuring the response of the animal to the infection. Simultaneously, the infectivity of the invading pneumococcus was measured by its ability to multiply at the site of infection and to spread to other parts of the host.



Pneumococcal substances were isolated from the circulating and exudative leukocytes of rats and guinea pigs. Also, pneumococcal substances were isolated from the exudates and plasma of both hosts. It was found that the substances obtained from the resistant guinea pig were more pneumococcal than those from the susceptible rat.

No evidence was found to indicate that the leukocyte pneumococcal substance was associated with acquired immunity.

The pneumococcal substances are believed to be proteinaceous since they contain about 15% nitrogen, give a positive biuret test, and have high isoelectric points.

92 pages. \$1.15. MicA54-1488

#### THE ROLE OF CELLULAR PERMEABILITY IN THE OXIDATIVE METABOLISM OF CERTAIN ORGANIC ACIDS BY BRUCELLAE

(Publication No. 8298)

Arvid Leonard Erlandson, Jr., Ph. D.  
University of Michigan, 1954

Previous work has suggested that permeability may be rate limiting in certain oxidative reactions of smooth *Brucella abortus*, strain 19. This premise was tested further by a more detailed study of the oxidation of succinate by resting cells, which reaction is markedly enhanced by the environmental variables of lowered pH and increased concentration of substrate. The oxidations of L-glutamate and citrate were used for purposes of comparison, since, in contrast to the apparently intermediate position of succinate, the cell appeared highly permeable to glutamate and essentially impermeable to citrate.

It follows as a corollary of the basic premise that when the rate of oxygen uptake (B) is increased by means of an environmental variable, there should be an equal or greater response in the rate of uptake of substrate (A), if permeability is rate limiting. When A and B were followed at increased concentration, lowered pH, or a combination of the two variables in the succinate system, a considerably greater increase in A than B was found. In contrast, no increase in either A or B was noted with comparable changes in the citrate system and only a minimal increase in A and B was noted with the glutamate system. Thus the observations found experimentally with the three systems appeared to be consistent with the test corollary and, thereby, the basic premise of the rate-limiting role of permeability.

The site of the increased activity, noted with succinate, was determined by physically disrupting the cells, using a freeze-thaw technique, so as to divorce the intracellular oxidation from a permeability influence. The effect of the increased concentration of substrate was found to be comparable with that noted in intact cells, indicating that increased concentration primarily affected the intracellular oxidation. In contrast, the effect of lowered pH upon the oxidation of succinate was found to be reversed when the cells were disrupted physically. This

suggested that lowered pH primarily affected the extracellular rate of penetration. The optimal pH for succinoxidase activity apparently differed for intact (5.5) and disrupted (7.0) cells and did not appear to be associated with the buffer used.

The disparate increase of A over B could not be attributed to intracellular pooling of free succinate and only partially to assimilation (10-15 per cent). Isotopic analyses indicated that an intermediate accumulated increasingly with increased A. This observation was confirmed by analysis for pyruvate which, with carbon dioxide, accounted for most of the succinate used. No evidence was found for appreciable accumulation of other keto acids or amino acids. There was no evidence of a change to an alternate metabolic pathway with lowered pH. The accumulation of pyruvate suggested that the oxidation of pyruvate might be a secondary limiting reaction in the oxidation of succinate. Optimal oxidative rate data for pyruvate were consistent with this viewpoint.

The optimal pH for succinoxidase activity was found to become higher with increased concentration and, similarly, the optimal concentration, with increased pH. Calculations from this suggested that the pH optimum was dependent on the concentration of undissociated molecules and not on the total concentration. Similar observations were noted with pyruvate.

Attempts to negate the apparent permeability barrier of intact cells with surface active agents and substituted substrate derivatives were unsuccessful.

The findings were discussed and a provisional model of the role of cellular permeability in the intermediate metabolism of succinate by *Brucella abortus*, strain 19, was formulated.

108 pages. \$1.35. MicA54-1489

#### FRACTIONATION AND DIFFERENTIATION OF HUMAN, BOVINE, AND AVIAN STRAINS OF MYCOBACTERIUM TUBERCULOSIS BY MEANS OF THEIR INFRARED SPECTRUMS

(Publication No. 8312)

William Knox Harrell, Ph. D.  
University of Michigan, 1954

The purpose of this investigation was to determine whether or not it was possible to differentiate between human, bovine and avian strains of tubercle bacilli by infrared spectrographic examination of various fractions of the microorganisms.

The organisms were grown on the surface of a liquid synthetic malic acid medium at 37°C. for six weeks. At the end of this time the cells were separated from the medium and killed with ethanol. Using different procedures the following fractions were obtained and compared spectroscopically: phosphatides, acetone soluble fats, waxes, chloroform-methanol soluble material, benzene soluble material, chloroform soluble material, materials soluble in a 1:1 mixture of chloroform-methanol at 25°C. but

insoluble in this solvent at 5°C., -30°C. and -60°C. The latter three fractions were subfractionated by column chromatography and batch adsorption and elution using the following solvents: petroleum ether, petroleum ether-benzene (equal parts), benzene, benzene-ether (equal parts), ether, ether-methanol (equal parts) and methanol. A 1:2 mixture of Magnesol-Celite was used as the absorbant in the chromatographic columns, while Magnesol alone was used for the batch adsorption technique. The solvents or aliquots of the solvents were evaporated to dryness and the resulting lipid residue submitted for infrared spectroscopy.

In addition to the above procedures, the alcohol-killed cells of human and bovine strains were extracted directly with a equal mixture of benzene-ether.

It was found that the 5°C. chloroform-methanol insoluble material permitted the differentiation of the avian strains from either human or bovine strains of the tubercle bacillus. This fraction from the latter two strains gave identical infrared spectrums.

By the techniques of chromatography or batch adsorption it was possible to isolate from the -30°C. and -60°C. chloroform-methanol insoluble fractions of bovine-type cells a product which appears to be characteristic for these organisms. This material was present in the benzene-ether eluates from the chromatographic columns and in the benzene-ether

and ether eluates using the batch adsorption technique. It has an absorption band at 6.63 microns which does not appear in any of the fractions obtained from recently isolated human strains. Fractions containing the 6.63 micron band have been isolated from a total of five bovine strains by these techniques. It was not possible to isolate comparable fractions from a total of ten recently isolated human strains using the same techniques.

Under the proper conditions, the components responsible for the 6.63 micron band can be obtained by direct extraction of 0.1 gm or more of the alcohol killed bovine cells using a 1:1 mixture of benzene-ether. By this method it was possible to isolate the components having the 6.63 micron band from seven strains of bovine origin. By the same technique it was not possible to obtain comparable fractions from seven recently isolated human strains. Of the seven bovine cultures studied by this technique, five were attenuated bovine strains used as vaccine (B. C. G.).

No evidence was obtained to indicate that the components responsible for the 6.63 micron band are biologically active. Chemical analysis showed the material to be free of carbohydrates, proteins, phosphorus, and nitrogen. It has a low iodine number and low melting point and is soluble only in organic solvents.

76 pages. \$1.00. MicA54-1490

## BIOLOGY — GENETICS

### CYTOGENETIC AND CYTOTAXONOMIC INVESTIGATIONS IN EUPATORIUM, CELOSIA, AND ACANTHACEAE

(Publication No. 7964)

William Frederick Grant, Ph. D.  
University of Virginia, 1953

#### Part I. CYTOTAXONOMIC STUDIES IN THE GENUS EUPATORIUM

*Eupatorium* L. (Compositae) is a large tropical to subtropical cosmopolitan genus of over 500 species whose center of distribution lies in the warmer regions of North and South America. The morphological similarity which exists between certain species and the numerous specific descriptions and many poorly defined species have caused considerable taxonomic disagreement in the genus. It has been the purpose of this study to obtain evidence through a cytological survey of the species which might facilitate in determining both the inter- and intraspecific and intersectional relationships in the genus.

Chromosome number determinations have been made for 44 species, varieties and forms and for

one species of *Vernonia* (*V. cinerea* (L.) Less.). The latter species represents the first report of a chromosome number for the tribe Vernonieae. Polyploidy has been found in the sections, *Verticillata*, *Subimbricata* and *Eximbricata*. An agamic species complex has been discovered in the *Subimbricata*, involving with the present evidence 7 diploid and supporting 11 polyploid species. Hybridization, polyploidy and apomixis are believed to have played an important part in the formation of new species.

A phylogenetic arrangement of the genus has been erected whereby the high basic chromosome numbers can be derived from those of the tribe Astereae. The tribe Vernonieae appears to be derived from the Astereae rather than from the Eupatorieae. Cytological evidence would lend support to those authors who have made the section *Conoclinium* a separate genus (*Conoclinium* DC.).

Annual species which are considered to be derived from perennial species possessed the smallest sized flower heads. Reduction in size of the flower head appears to indicate an evolutionary advancement in the genus. The number of florets in the heads did not follow such a trend.

The present center of frequency and variation indicates a tropical or subtropical origin with a



subsequent holarctic distribution of the species to give the present world distribution pattern.

**Part 2. A CYTOLOGICAL STUDY OF CELOSIA ARGENTEA, C. ARGENTEA VARIETY CRISTATA AND THEIR HYBRIDS**

From several thousand seedlings of a true breeding strain of *Celosia argentea* L. (Amaranthaceae) interplanted with Cockscomb, *C. argentea* var. *cristata* (L.) Ktze., in the hopes of obtaining spontaneous hybrids between these two forms, an aberrant plant was observed by Dr. Orland E. White. A cytological study of this plant and the parents proved it to be a hybrid. Eight  $F_2$  plants were raised from seed of this almost sterile hybrid and studied cytologically. The hybrid possessed a chromosome number ( $2n = 54$ ) intermediate to that of the parents ( $2n = 36$  and  $72$ , for Cockscomb and *C. argentea* respectively). The parents exhibit typical meiotic pairing and no irregularities were observed. A cross between these species has been previously reported by Wakakuwa in which the meiotic behavior of such a hybrid was described. Of the 8  $F_2$  plants investigated in this study, somatic chromosome numbers of 54 (3 plants), 81 (1) and 108 (4) were observed. Atypical meiotic behavior was found in all the  $F_2$  plants. These aberrations in microsporogenesis resulted in many types of microspores. An estimate of the percentage fertility of the plants is given. Genomic formulas for the parents (CC for Cockscomb and CCAABB for *C. argentea*,  $C = 18$ ,  $A$  and  $B = 9$  chromosomes respectively), the  $F_1$  (CCAB) and  $F_2$  (CCAA, CCBB or CCAB,  $2n = 54$ ; CCCAAB, CCCABB, CCCCA or CCCCB,  $2n = 81$ ; CCCCAABB,  $2n = 108$ ) have been proposed for the genetic relationships of the plants. Evidence is presented whereby *C. argentea* is considered to be derived as an allopolyploid from Cockscomb. Both stomatal and pollen grain size increased in proportion to the increase in chromosome number. Cockscomb is considered to have been incorrectly made a variety of *C. argentea* and should be reinstated as *C. cristata* L. As a result of fasciations of the inflorescence there is probably an insufficient number of flowers producing seed for Cockscomb to maintain itself in nature.

**Part 3. CYTOGENETIC STUDIES IN THE ACANTHACEAE**

The Acanthaceae (Order Tubiflorae) is a large pantropical family with many unique morphological characteristics. The classification has been based largely on pollen-sculpture and minor characters of the anthers. A cytological study of available species for the whole family was made to investigate generic relationships and lay a foundation for further investigation of specific taxa which might aid in taxonomic studies.

Chromosome number determinations have been made for 79 species and varieties distributed among 27 genera of which 65 are reported for the first time. The following basic chromosome numbers were found: (5), 6, 7, 8, 9, 10, 11 and 19. The primary basic chromosome number is considered to be 7, since this is the predominant basic number

throughout the family. However, this may be derived from a basic number of 9, since a haploid number of 9 is found in two primitive tropical species of *Thunbergia* which represent the lowest chromosome number found in the family. Aneuploid chromosome series were found in *Justicia*, *Thunbergia* and *Crossandra*. Euploid species occur in *Acanthus*, *Fittonia*, *Dicliptera* and *Strobilanthes*. It is suggested that polyploidy may be as frequent in some tropical families as for those of the northern flora. The high incidence of polyploidy may be the result of the large number of herbaceous perennials studied. Satellite chromosomes have been found in the majority of the species. A consideration of the relation of chromosome number to life habit has been made. The direction of evolution in the family is believed to be from the woody perennial to the herbaceous perennial.

244 pages. \$3.05. MicA54-1491

**A HISTOLOGICAL STUDY OF STENOSTOMUM VIRGINIANUM WITH OBSERVATIONS ON THE PARENCHYMA OF PRORHYNCHUS SP.**

(Publication No. 7983)

Edwin Wesley Pullen, Ph. D.  
University of Virginia, 1953

The Turbellaria, the most primitive class of the Bilateria, is composed of animals which have cellular elements between the body wall and the intestinal sac. These cellular elements, the mesenchyme, are of considerable phylogenetic and physiological importance and are generally considered to be poorly understood. The principal aim of this investigation was to determine the cell-types and their disposition in representatives of the orders Rhabdocoela and Alloeocoela; however, preliminary work revealed that a detailed account of the general histology was needed. The study, then, consists of a detailed anatomical investigation of the rhabdocoel *Stenostomum virginianum* with comparative notes on the histology of the mesenchyme and epidermis of the alloeocoel *Prorhynchus* sp.

The epidermis of *S. virginianum* rests on a discrete lamellate, collagenous basement membrane and consists of two types of cells. One of these, the definitive cell or epidermal cell proper, is characterized by the presence of rhabdites and cilia; the other is the interstitial or proliferative cell in which mitosis occurs.

The muscular system of *S. virginianum* consists of two groups of muscles; subepidermal and pharyngeal, both of which are non-striated. The subepidermal musculature consists only of longitudinal fibers; no circular fibers exist. The pharyngeal muscles are of two types, the intrinsic which consist of circular and longitudinal and the radial muscles of which there are protractors and retractors. The sphincters of the mouth and pharyngo-enteric passage are modified circular muscles. The intestine has no intrinsic muscles and there are no radial fibers between the body wall and the intestine.



The digestive system of *S. virginianum* is composed of an oral aperture, pharynx, and intestine. The oral aperture is merely the opening leading from the exterior to the cavity of the pharynx. The pharynx is simple in type and is lined by a non-ciliated syncytial epithelium. Associated with the pharyngeal wall are a number of multicellular glands; these are more commonly found at the posterior end of the pharynx. The intestine is composed of a simple epithelium, the gastrodermis, lying on a basement membrane. The gastrodermal cells are of two types: the ciliated cell is more predominant in form and quantity, and the stem cell is non-ciliated, and displays a high mitotic rate.

The mesenchyme of *S. virginianum* is of the collenchymal type, the cells of which are dispersed in a rather spacious pseudocoel. The free cells consist of two types, the histiocytes and amoebocytes. The histiocytes are large and phagocytic in nature; they are commonly seen anywhere in the pseudocoel and there is no evidence of attachment. The amoebocytes are of two types, acidophilic and basophilic with a series of intergrades between. The amoebocytes are frequently attached to the subepidermal basement membrane and occasionally to the intestinal basement membrane.

The excretory system of *S. virginianum* is of the protonephridial type. It consists of a long tube which is reflected upon itself to form two limbs, a main stem and a capillary portion, both of which are in close association. The posterior extremity of the main stem opens to the exterior at the nephridiopore;

the anterior extremity joins the capillary portion which extends posteriorly to end blindly near the nephridiopore. The protonephridium is syncytial between fission planes, and at the fission planes it is cellular. The capillary portion receives very fine twigs – the capillaries of the flame cells.

In the study of the collenchyma of *S. virginianum* it was necessary to repeat the vital stain experiments of Carter.<sup>1</sup> Experiments with Bismarck brown and toluidine blue were made, and different results from those of Carter were obtained. An alternative working explanation is offered for the observations so recorded.

Experiments with Bismarck brown led to a further study of the relationship between the rhabdites in *S. virginianum* and the production of the mucoid material which is frequently deposited about the animal. By experimentation it has been demonstrated that there is a causal relationship between rhabdites and mucous production in this species. The facts strongly indicate that rhabdites are mucous organelles of the epidermal cells proper.

The final phase of the research was a comparison of the mesenchyme of the alloecoel *Prorhynchus* sp. and that of the rhabdocoel *S. virginianum*. The observations indicate a clear relationship between the two forms. In *Prorhynchus* sp. both histiocytes and acidophilic amoebocytes are seen. In addition, a parenchymal syncytium is described.

140 pages. \$1.75. MicA54-1492

1. Carter, J. S. 1933. Reactions of *Stenostomum* to vital staining., J. Exp. Zool., 65: 159-181.

## BOTANY

### STUDIES OF *LITCHI CHINENSIS* SONN.

(Publication No. 8332)

Su-Ying Liu, Ph. D.  
University of Michigan, 1954

*Litchi chinensis* (English, lychee) was a subject of a monograph in Chinese as early as the Sung dynasty, and there was much subsequent Chinese literature which is reviewed in connection with modern scientific studies. The lychee has been introduced successfully into Florida, where several horticultural varieties have been studied that are representative of the range of variation of the species as it occurs in China. These horticultural varieties are generally clones (known by vernacular names) which may be taken to typify botanical varieties made up of several or many clones each. Eight botanical varieties are described and named.

*Litchi chinensis* presents an example of a complex of types probably derived by cultivation from more than one wild progenitor, but now so intermingled that the distinguishable varieties are of no determinable geographic origin. Nevertheless it is

believed that a botanical classification, as presented, is justifiable and will be useful. The origin of varieties by mutation and hybridization is explained hypothetically.

The horticultural varieties which have been introduced into Florida were chosen by plant introducers to represent the conspicuous variations that occur in China. They are mostly clones, but some of these clones give seedlings which in general conform to the type of the parent tree. This is true of the clones that are typified by var. hort. "Brewster" in Florida, but "Chen-Family-Purple" in China. Seedlings of horticultural variety "Mountain Lychee" (Shan Chih) are generally characteristic of a botanical variety which is presumed to be similar, at least, to one of the wild progenitors of the cultivated varieties, and possibly the only progenitor which remains without having been profoundly modified by hybridization and selection. The nomenclatural type of *Litchi chinensis* probably belongs to one of the better horticultural varieties, which, as a group, are clearly distinct from var. hort. "Shan Chih".

There are three types of lychee flowers, namely, staminate, pistillate, and imperfectly hermaphroditic

which appear consecutively on the same panicle in two sequences. In some varieties the shift from one type of flower to the other occurs suddenly during the intermission period rather than gradually, but in other varieties there is an overlapping period of a few days. The pollen produced by the different types of flowers varies in form and in viability.

Somatic chromosome counts were made from root-tip smears, both from roots of seedlings and air-layered plants. The haploid chromosome number of lychee according to the counts of chromosome pairs is 14, 15, and 16, or rarely even 17.

Illustrations and data about the different stages of fruit-formation and fruit-setting in representative varieties are given. It is indicated that the highest percentage of dropping of young fruit occurs during the first month after setting. The dropping of young lychee fruit may be partly attributed to nutritional factors, and partly to failure in fertilization, to embryo malformation, and to embryo abortion. The latter may possibly be caused by lethal unbalance resulting from pollination by square pollen grains, which are probably abnormal cytologically. It is suggested that they may be diploid, as in *Oenothera* and *Solanum*, and that seeds with triploid embryos drop.

Other subjects dealt with are the variation in number and distribution of stomata, the possible commercial utilization of the ability of the lychee to produce parthenocarpic fruit, the history and status of lychee cultivation in China, the history of introductions into Florida, and the developmental morphology of the fruit.

274 pages. \$3.43. MicA54-1493

# A COMPARATIVE STUDY OF WOOD ANATOMY OF FIFTY-FOUR SPECIES OF THE FAMILY AQUIFOLIACEAE

(Publication No. 7981)

Maggie Thurman Pennington, Ph. D.  
University of Virginia, 1953

The Aquifoliaceae is a small family widely distributed over the world. It is composed of trees and shrubs, most species being evergreen. The family contains five genera: *Ilex*, the largest and most widely distributed genus of over three hundred species; *Phelline*, a monotypic genus restricted to New Caledonia; *Byronia*, consisting of three species reported from the Hawaiian Islands and Tahiti; *Sphegnostemon*, a monotypic genus also reported from New Caledonia; and *Nemopanthes*, a third monotypic genus common to northeastern United States.

Very little anatomical evidence of secondary growth of stems has hitherto been available to taxonomists to assist them in evaluating this family. Previous workers have restricted work to the flowers, fruits, young stems, and leaves for the most part. It is the aim of this study to present a more complete analysis of secondary woods of fifty-four species of this family.

Materials for this study consisted of portions of

stems evidencing secondary growth. These were obtained in part by collections of the writer, but to a greater extent through the courtesy of the Florida Agriculture Experimental Station, the Chicago Museum of Natural History, the Yale School of Forestry, the Blandy Experimental Farm of the University of Virginia, and Dr. W. J. Phillips of Charlottesville, Virginia who gave freely of his private collection. Those specimens received from the Chicago Museum of Natural History and the Yale School of Forestry were herbarium specimens, while all others were fresh.

Both macerations and sections were made of each of the fifty-four species studied. Macerations were made by using a modification of Jeffrey's method as reported by Titman ('38) in a similar study of the Nyssaceae. Macerated wood elements were stored in vials of glycerin-alcohol-water which facilitated extraction of small quantities for observation at any time. Some elements of each species were also mounted in balsam for permanent record.

Fresh material was fixed in formal-acetic-alcohol. Woods were boiled prior to sectioning. Transverse, longitudinal and tangential sections were made using a sliding microtome. Sections were cut at ten to twenty microns. All sections were stained with iron-haematoxylin and counterstained in safranin according to the schedule in Johansen's *Microtechnique*. One modification was necessary to obtain the desired stain. This involved a reduction of the haematoxylin time by one half and, of the safranin time from two hours to thirty minutes.

Numerous investigators have established basic criteria for the comparative study of secondary xylem. Among these, the conclusions of Frost ('30) ('31), Kribs ('35) and, Gilbert ('40) are of particular significance. Frost described in detail the phylogenetic development of the vessel elements in the secondary wood of the dicotyledons. Using the series of vessel characteristics established by Frost as phylogenetic indicators, Kribs defined six basic types of medullary rays which are believed to exhibit various degrees of specialization. Gilbert established that the evolutionary development of secondary wood proceeds from a primitive diffuse-porous arrangement of vessel elements to a ring-porous condition.

The conclusions of Frost, Kribs and Gilbert are used as criteria on the comparative study of the secondary woods of the Aquifoliaceae.

The following is a summary of the characteristics measured and observed for each xylem element:

- (a) length of element;
- (b) diameter of element;
- (c) wall thickness of element;
- (d) angularity of vessel and wall;
- (e) cross-section outline of vessel;
- (f) presence of tertiary thickenings;
- (g) end wall perforations;
- (h) side wall pits;
- (i) even or uneven side wall thickenings;
- (j) cellular inclusions.

Observations were made on xylem vessels, tracheids, fibers and parenchyma. One hundred



tabulations of all observations and measurements listed above were recorded for each of the elements in all fifty-four species studied. This involved approximately 4000 readings for each species, or a total of 216,000 readings. After all tabulations were completed mean measurements were determined. Standard deviations and critical ratios were determined for some of the species and all calculations indicated reliability of data. Further work is planned in this regard.

The family Aquifoliaceae does not exhibit a gradual transition from most primitive to most advanced conditions in each of the phylogenetic lines established by Frost and Kribs.

The genus *Sphenostemon* differs greatly from the other genera of the Aquifoliaceae as regards vessels except in regards to the presence of tertiary thickenings and side wall pitting, thus satisfying the major criteria established by Frost for phylogenetically advanced plants. No outstanding differences are noticed between fibers and parenchyma of *Sphenostemon* and those of the other genera of this family. This genus appears to be the most advanced genus of the Aquifoliaceae.

The genera *Byronia*, *Nemopanthes* and *Phelline* are intermediate in vessel length and diameter, but have rather thick vessel walls. No outstanding characteristics of fibers are apparent except the presence of septate fibers in *Byronia sandwicensis*. Parenchyma is abundant in *Byronia* and *Nemopanthes* moderate in *Phelline*. Crystals are found in *Byronia* and *Nemopanthes* and pitting of parenchyma is simple. No crystals occur in *Phelline* and pits are semi-bordered. Rays are Heterogeneous Type IIA in *Byronia* and *Phelline* and both uniseriate and multiseriate portions are present. Uniseriate and multiseriate rays of *Nemopanthes* are Heterogeneous Type IIB.

The genus *Ilex* is a variable group as regards mean vessel length, but in all species considered mean vessel diameter is small. Wall thickness is rather consistent. Tertiary thickenings are present in all species included except *Ilex cymosa* and *I. othera*. Consistency is observed in all vessel characters.

Six species of *Ilex* have short fibers and all others are intermediate in length. *Ilex* is consistent in fiber wall thickness and in cross-sectional outline. Pits vary from simple unbordered to vestigial borders to fully bordered pits. Both libriform fibers and fiber-tracheids are thus observed in *Ilex*.

Parenchyma is apotracheal and moderate in occurrence in *Ilex*. Parenchyma pits are simple in all but four species. Druses occur in the parenchyma of five species.

Tracheids are present in three species of *Ilex* but are few in number.

Rays belonging to Heterogeneous Type I, Heterogeneous Type IIA and Heterogeneous Type IIB occur in *Ilex*.

In conclusion, the family Aquifoliaceae is from the standpoint of wood anatomy a natural one and well defined. The only aberrant genus is *Sphenostemon*, which does not fit the holly pattern in several respects, especially in the character of the vessels.

In all characteristics it fits into the advanced category as defined by Frost.

39 pages. \$1.00. MicA54-1494

THE VASCULAR PLANTS OF EMMET AND  
CHEBOYGAN COUNTIES, MICHIGAN: PATTERNS  
AND PROBLEMS IN GEOGRAPHIC AFFINITIES

(Publication No. 8335)

Edward Groesbeck Voss, Ph. D.  
University of Michigan, 1954

The present study considers the vascular plants of the two counties at the northern tip of the Lower Peninsula of Michigan (the region of the University of Michigan Biological Station), and the total range patterns in North America which are represented by the indigenous species of those counties. As an attempted synthesis of aspects of floristics, taxonomy, glacial chronology, ecology, and biogeography, this study has sought to provide a perspective against which future detailed work in the individual related fields might have greater meaning.

Field and herbarium studies have resulted in a list of 866 indigenous species which are supported by specimens in herbaria. An appendix accounts for the disposition of previously published records which, because of misidentification, lack of supporting specimens, or other reasons, are not now accepted; it also provides a list of species which have not previously been reported from the region. Another appendix lists the 295 non-indigenous species, with annotations regarding those indigenous in neighboring regions but not considered indigenous in the counties studied.

Background material presented includes a brief history of botanical exploration in the area, beginning with Thomas Nuttall; a summary of late-glacial and postglacial history in the upper Great Lakes region, with special reference to the Lakes themselves; and a discussion of climatic effects beyond the glacial border, in which section are summarized various pieces of evidence which lead to the conclusion that glaciers did not seriously disrupt vegetation to any great distance beyond the ice front.

A brief discussion is given of the relationship between problems of taxonomic differentiation and geographic affinity. Generally speaking, infraspecific categories have not been considered in the present study, for lack of evidence that they are of pre-glacial differentiation.

On the basis of individual distribution maps [not published], compiled from critical use of local floras, lists, monographs, etc., the indigenous species are grouped under six main headings: "Continental," "transcontinental (or nearly so) in the north," "wide range in the east," "Appalachian and northeastern range," "miscellaneous, mostly interior, range," "coastal and inland distribution." (In addition, four species are considered too anomalous to associate with a basic group.) These main sections are subdivided into smaller floristic groups, based primarily on the regions from which the species are



presumed to have repopulated glaciated territory and on coincidence of present range outlines of the species, a criterion capable of fairly uniform application to an entire flora.

Within each floristic group are presented and interpreted available data from pollen analysis, variation, and other sources which indicate particular migration routes to the region under study. The significance of low-water stages in the past history of the Great Lakes is considered with migration routes and sequences. In the light of the chronology of geological events and present knowledge of distribution of the species concerned, it is concluded that the coastal plain element in the Great Lakes flora entered this region no earlier than the time of Lake Algonquin, and that the species of sandy shores

and dunes (rather than of peaty or marshy shores or bogs) probably entered later – possibly in Nipissing time.

Although it is clear that present range alone is not, usually, a sufficient indication of migration route, it has been possible to give a general idea of the importance of particular migration routes within each range pattern. It is concluded that over one-half of the species in the flora studied have been derived from populations which survived glaciation in the Appalachian region; and that the species ranging primarily northward from the region studied are of much less importance in the flora and the vegetation.

294 pages. \$3.68. MicA54-1495

## CHEMISTRY

### CHEMISTRY, GENERAL

#### STUDY OF THE DIRECT METHODS FOR THE MEASUREMENT OF POLARIZATION

(Publication No. 8323)

Robert Stephen Karpiuk, Ph.D.  
University of Michigan, 1953

A review of polarization data shows an exceedingly wide divergence in the values for polarization or overvoltage obtained by different investigators. Since the commutator method has been shown to be definitely inferior to the direct method of measurement, a study of the four common modifications of the direct method and some of the variables affecting the measured potentials was made, both potentiometrically and oscillographically, in an attempt to clarify this situation.

The methods studied were (a) the Haring cell arrangement, (b) the front method, *i.e.*, with the tip of the probe in firm contact with the front face of the electrode, (c) the back method, *i.e.*, with the probe placed anywhere behind the electrode, and (d) the hole method, in which the tip of the probe was brought from the back, through a hole in the electrode and placed flush with the front face.

Both static values and polarization data were obtained with large copper electrodes in acid copper sulfate solution and with bright platinum in molar sulfuric acid. By following certain precautions previously found necessary in this laboratory, an accuracy of 1 mv. or better was attained.

It was found, in a study of both large and small electrodes, that a uniform current density was absolutely necessary for significant results by any method. A non-uniform current density creates regions of different concentration resulting in corrosion currents. This may add to or oppose the potential

difference being measured and appears as an IR drop between the two half-cells used in the measurement. To obtain the above ideal condition, the back of the electrode must be insulated in order to limit the apparent surface area to the cross-sectional area of the cell. With smaller electrodes, the position of the probe has a pronounced influence on measured potentials, and correct polarization values can not be obtained by such an arrangement.

In all cases in which measurements were made by the various methods, and the back of the electrode was properly insulated, the Haring cell method gave consistently lower values (by about 10%) for polarization than the front method. The results are highly reproducible and if deviations of the above magnitude are permissible, the method provides a simple convenient tool.

Measurements by the front method must involve both an IR drop and a shielding effect which, however, tend to counteract each other. Results of this research indicate that the corrections for IR drop between the probe and the electrode, by using the bulk conductivity of the solution, may be in error. It has been shown also that the extrapolation technique used to correct for IR drop exaggerates the error due to the shielding effect. Thus, no exact value of polarization can be obtained by the front method even when the commonly used methods for corrections are used.

On the basis of this research, it is concluded that the back method gives precise and reproducible values to 1 mv., provided precautions are taken to ensure uniform current distribution and to insulate properly the electrode. If a uniform current distribution can not be obtained, the hole method will give the best results provided suitable precautions and design are employed.

193 pages. \$2.41. MicA54-1496

## CHEMISTRY, INORGANIC

A STUDY OF THE REACTIONS OF  
DIBORANE WITH HYDROXYLAMINE AND  
WITH METHOXYAMINE

(Publication No. 8283)

David Holcomb Campbell, Ph.D.  
University of Michigan, 1953

The purpose of this investigation was to study the reactions of diborane with hydroxylamine and with methoxyamine under various sets of experimental conditions. The problem involved the determination of the stoichiometry of the reaction, and the separation, identification, and determination of the properties of the reaction products.

In the absence of a solvent, there was no evidence of reaction between diborane and hydroxylamine at temperatures up to  $-100^{\circ}\text{C}$ , but an explosive reaction occurred at a higher temperature, with the formation of a white solid reaction product. In the presence of ether, two moles of hydroxylamine react with one mole of diborane at  $-112^{\circ}\text{C}$ , yielding a white solid product which is insoluble in ether. The reaction is somewhat reversible. At temperatures of  $-78^{\circ}\text{C}$  and above, the addition compound loses hydrogen. The amount of hydrogen lost per mole of hydroxylamine used approaches one mole at about  $25^{\circ}\text{C}$  and two moles at  $125^{\circ}\text{C}$ . The product remaining after the loss of the first mole of hydrogen is a white solid which dissolves in water, methanol, and ethanol, with the evolution of a small amount of hydrogen, but does not dissolve in ether, benzene, toluene, 1,4-dioxane, or liquid ammonia. The product remaining after the loss of the second mole of hydrogen dissolves with difficulty in water, but readily in dilute acid or base. It is insoluble in ether, benzene, toluene, and 1,4-dioxane.

There is evidence that the first mole of hydrogen evolved results from intermolecular elimination from hydroxyl and borine groups, with attendant polymerization, and that the second mole results from either intra- or intermolecular elimination from amine and borine groups.

Two moles of methoxyamine combine irreversibly with one mole of diborane at  $-112^{\circ}\text{C}$  in ethyl ether solution as well as in the absence of a solvent, forming methoxyamine borine,  $\text{CH}_3\text{ONH}_2\text{BH}_3$ . Methoxyamine borine is a white, crystalline solid which is insoluble in ether below  $0^{\circ}\text{C}$ , but soluble at  $0^{\circ}\text{C}$  and above. The solid compound loses hydrogen when heated above room temperature. It also loses hydrogen from its ether solution. There is evidence that the latter reaction is sensitive to catalysis.

The experimental evidence indicates that the loss of a mole of hydrogen by methoxyamine borine in ether solution at  $0^{\circ}\text{C}$  yields methoxyaminoborine,  $\text{CH}_3\text{ONHBH}_2$ . The latter compound is a liquid which is stable at  $0^{\circ}\text{C}$ , but undergoes disproportionation at temperatures above  $14^{\circ}\text{C}$ , yielding a solid and a more volatile compound tentatively identified as diborane. The loss of a mole of hydrogen by methoxyamine borine at temperatures above  $25^{\circ}\text{C}$  yields a polymer which is insoluble in ether. There is also evidence

that a small amount of volatile isomer of methoxyaminoborine is formed, as well as traces of other volatile compounds which have not been completely characterized.

Rapid heating of methoxyamine borine to  $90^{\circ}\text{C}$  causes a rapid evolution of hydrogen, and finally an explosion. A more gradual increase in temperature to  $215^{\circ}\text{C}$  results in the loss of two moles of hydrogen, yielding a white solid which is insoluble in ether, but soluble in water. 83 pages. \$1.04. MicA54-1497

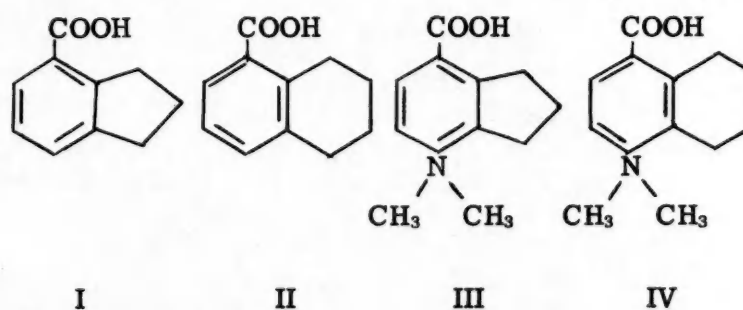
## CHEMISTRY, ORGANIC

THE STERIC EFFECT OF  $\alpha$ -METHYLENE  
GROUPS

(Publication No. 8117)

Arthur Eugene DeWald, Ph.D.  
University of Minnesota, 1954

Qualitative evidence accumulated by Arnold and coworkers indicates that the steric effect of an  $\alpha$ -methylene group of a five-membered ring is less than that of a six-membered ring. To obtain a more quantitative estimate of this effect, rates of saponification of the ethyl esters of acids I-IV were measured.



Hydrindene-4-carboxylic acid (I) was prepared by carbonation of the lithium derivative of 4-chlorohydrindene which was synthesized by Clemmensen reduction of 4-chlorohydrindone-1 obtained by ring closure of the acid chloride of o-chlorohydrocinamic acid.

Carbonation of the lithium derivative of 1-bromo-5,6,7,8-tetrahydronaphthalene, obtained from 1-amino-5,6,7,8-tetrahydronaphthalene by the Schweten reaction, gave II.

The amino acids III and IV were synthesized from 4-aminohydrindene and 1-amino-5,6,7,8-tetrahydronaphthalene. Dibromination of these primary amines gave dibromoamines which were converted to p-bromo-N,N-dimethylamines by treatment with formaldehyde, zinc and hydrochloric acid. Carbonation of the lithium derivatives of these bromoamines gave the amino acids III and IV. The structures of these acids were established by independent syntheses.

Treatment of acids I-IV with ethereal diazoethane converted them to their ethyl esters in 87-97% yield.

The rates of saponification (in  $1.\text{mole}^{-1}\text{min}^{-1}$ ) of the ethyl esters of acids I-IV, measured in 70% ethanol at  $25^{\circ}$  and  $55^{\circ}$ , were as follows: 1-carbethoxyhy-



drindene,  $k_{25}$  0.00855,  $k_{55}$  0.121; 1-carbethoxy-5,6,7,8-tetrahydronaphthalene,  $k_{25}$  0.00269,  $k_{55}$  0.0411; 4-N, N-dimethylamino-7-carbethoxyhydrindene,  $k_{25}$  0.00168,  $k_{55}$  0.0290; 1-N,N-dimethylamino-4-carbethoxy-5,6,7,8-tetrahydronaphthalene,  $k_{25}$  0.00116,  $k_{55}$  0.0195.

On the basis of results obtained by Westheimer and Metcalf for a series of ethyl benzoates, it was predicted that the p-dimethylamino esters would saponify more slowly than their simple esters. Furthermore, a greater steric effect of an  $\alpha$ -methylene group of a six-membered ring should tend to make 1-carbethoxy-4-N,N-dimethylamino-5,6,7,8-tetrahydronaphthalene more readily saponifiable relative to its simple ester, than 4-carbethoxy-7-N,N-dimethylaminohydrindene relative to its simple ester. The experimental data confirms these predictions and suggests that in the tetrahydronaphthalene series, the methylene group alpha to the N,N-dimethylamino group more effectively prevents its coplanarity with the benzenoid ring than does the corresponding group in the hydrindene series. The deactivating influence of the dimethylamino group through resonance interaction with the p-carbethoxyl group is therefore greater in the hydrindene series.

The three-fold decrease in rate observed in going from 4-carbethoxyhydrindene to 1-carbethoxy-5,6,7,8-tetrahydronaphthalene might indicate that the methylene group alpha to the carbethoxyl group sterically inhibits attack by a hydroxyl group to a greater extent in a six-membered ring than in a five-membered ring.

In the studies of the ultraviolet absorption spectra of N,N-dimethylanilines, diminution of intensity of the longer wave length absorption band has been used as a measure of the relative steric effect of ortho substituents. Absorption of low intensity was observed in the region 285-290 m $\mu$ . for the acids I and II and their ethyl esters. A dimethylamino substituent para to a carboxyl or a carbethoxyl group markedly increased the intensity of absorption at this longer wave length. The resulting amino acid III and amino ester of the hydrindene series were found to have absorption maxima near 300 m $\mu$ . with considerably greater extinction coefficients (and at longer wave lengths) than the corresponding compounds of the tetrahydronaphthalene series.

Both the kinetic and spectral data obtained in this study support the view of Arnold and coworkers that the steric effect of an  $\alpha$ -methylene group is greater in a six-membered ring than in a five-membered ring.

130 pages. \$1.63. MicA54-1498

#### THE REACTION BETWEEN ALLYLBENZENE AND VARIOUS DIENOPHILES

(Publication No. 8303)

Allen Howard Filbey, Ph. D.  
University of Michigan, 1953

The purpose of this treatise is to further define the mechanism of the reaction between a monoolefin and a dienophile by employing a common olefin (allyl-

benzene) and dienophiles of varying electronic character (phenylmaleic anhydride, p-nitrophenylmaleic anhydride). By way of introduction, various mechanisms postulated by previous investigators are described, involving both ionic and free-radical interpretations.

The first portion of the study deals with the development of separate syntheses for the three arylmaleic anhydrides. A new and improved synthesis of phenylmaleic anhydride is presented, involving a Reformatsky reaction on ethyl phenylglyoxylate (from the lead tetraacetate oxidation of ethyl mandelate) followed by hydrolysis and dehydration. Experimental details are given for the synthesis of p-nitrophenylmaleic anhydride, involving the condensation of ethyl glyoxylate (obtained from treatment of ethyl tartrate with lead tetraacetate) with p-nitrophenylacetic ester, hydrolysis, geometrical isomer separation, and thermal dehydration. Also discussed is the preparation of 1-(p-methoxyphenyl)-2-cyanoethene-1,2-dicarboxylic anhydride via a Knoevenagel condensation between ethyl p-methoxyphenylglyoxylate (from anisole and ethyl oxalyl chloride) and cyanoacetic ester, followed by alcoholic potassium hydroxide hydrolysis and dehydration. A number of unsuccessful attempts to completely hydrolyze the intermediate condensation product to p-methoxyphenylmaleic anhydride are explained in detail. Several other attempted procedures for the preparation of these arylmaleic anhydrides are discussed.

The second portion of the study describes the investigation of the reaction between allylbenzene and alkyl maleates, alkyl fumarate, p-nitrophenylmaleic anhydride and, in particular, phenylmaleic anhydride. In the case of the latter, there is presented a discussion of the possible structural nature of the adduct, as well as a description of the syntheses of 2,5-diphenylpentane-1,2-dicarboxylic anhydride and 1,5-diphenylpentane-1,2-dicarboxylic anhydride for comparison with the hydrogenated adduct. Also presented is the complete identification of the adduct mixture by chemical means (preferential monoanilide formation of the  $\alpha, \alpha'$ -isomer and decarboxylative acylation of the  $\alpha, \alpha'$ -isomer) and by physical means (quantitative infrared spectrography). Finally, the use of infrared spectrography in qualitatively evaluating the isomer ratio of the allylbenzene-p-nitrophenylmaleic anhydride adduct is demonstrated.

While no definite conclusions are drawn, it is pointed out that the much greater reactivity of p-nitrophenylmaleic anhydride toward allylbenzene as compared to phenylmaleic anhydride toward the same olefin strongly suggests an ionic mechanism. The fact that the isomer ratio in the adducts from these two systems is apparently quite similar (66%  $\alpha, \alpha'$ ; 34%  $\alpha, \alpha$ ) may indicate dominance of the steric influence of the phenyl group, although it is noted that a free-radical mechanism would also explain the similarity of the isomer ratio.

114 pages. \$1.43. MicA54-1499



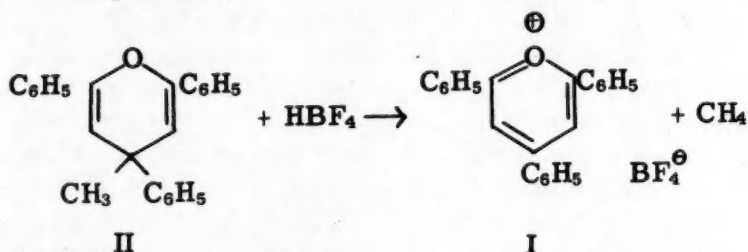
# AN INVESTIGATION OF THE POSSIBILITIES OF CARBON-CARBON BOND CLEAVAGE LEADING TO BENZOPYRYLIUM SALTS

(Publication No. 8325)

Te Piao King, Ph.D.

University of Michigan, 1953

The self condensation reaction of acetophenone in the presence of boron fluoride to form 2,4,6-triphenylpyrylium fluoborate (I) has been studied. Formation of the pyrylium salt was postulated by the original discoverers of this reaction as a result of the interaction of fluoboric acid and 4-methyl-2,4,6-triphenylpyran (II) formed by the condensation of three moles of acetophenone.



In contrast to the old postulate, it has now been shown that the pyrylium salt was formed through the interaction of dypnone formed by the condensation of two moles of acetophenone and benzoyl fluoborate formed by cleavage of dypnone with fluoboric acid.

In relation to the study of carbon-carbon bond cleavage of benzimidazolines to give benzimidazoles by Elderfield and his students it was of interest to seek such reactions in the oxygen heterocycles as shown above. For this purpose 2,4-diphenyl-4-methyl- $\gamma$ -chromene (III) and 2,4-diphenyl-2-methyl- $\alpha$ -chromene (IV) were synthesized. III was synthesized through ether cleavage and ring closure of  $\beta$ -(*o*-anisyl)- $\beta$ -phenylbutyrophenone. IV was synthesized through condensation of methylmagnesium iodide with 2,4-diphenylbenzopyrylium perchlorate.

Compounds III and IV were treated under conditions which might be expected to induce a cleavage reaction, but such a reaction was not observed.

For the unsuccessful synthesis of 2,4-diphenyl-4-(9-fluorenyl)- $\gamma$ -chromene, ethyl  $\alpha$ -cyano- $\beta$ -(*o*-anisyl)- $\beta$ -(9-fluorenyl)- $\beta$ -phenylpropionate (V) was prepared by addition of 9-fluorenyl potassium to ethyl  $\alpha$ -cyano- $\beta$ -(*o*-anisyl)-cinnamate. Upon alkaline hydrolysis of V, a complete reversal of the addition reaction occurred to give fluorene and  $\alpha$ -cyano- $\beta$ -(*o*-anisyl)-cinnamic acid. Upon acid hydrolysis of V, a neutral compound was formed which is either *o*-anisyl-(9-fluorenyl)-phenylmethane or 2-(*o*-anisyl)-2-(9-fluorenyl)-2-phenylethane.

66 pages. \$1.00. MicA54-1500

## AROMATIZATION STUDIES IN THE NAPHTHALENE SERIES

(Publication No. 8264)

Arthur Irwin Lowell, Ph.D.

University of Pennsylvania, 1951

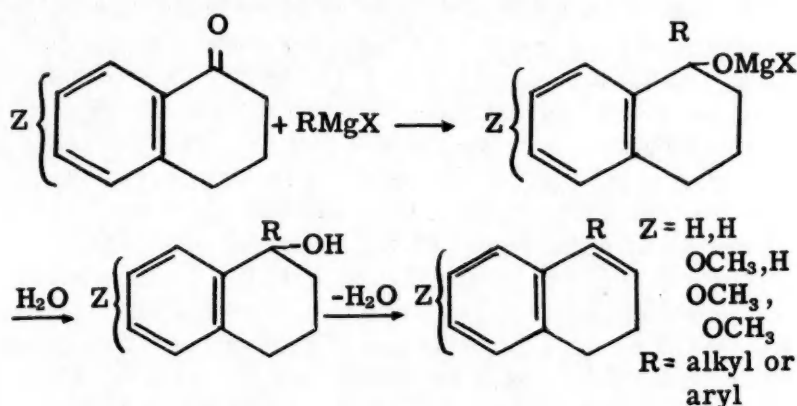
Supervisor: Dr. E. C. Horning

The conversion of an alicyclic compound at the same formal level of saturation as an aromatic com-

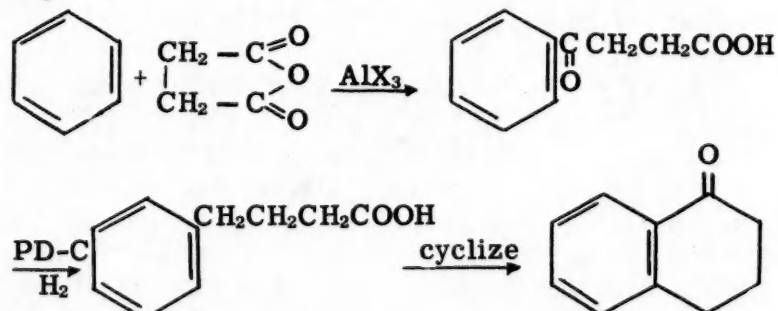
pound, or at a higher level, to an aromatic compound is called aromatization. This transformation can be accomplished by fission of carbon-carbon bonds, hydrogen redistribution, or dehydrogenation of the alicyclic precursor.

The work described in this dissertation concerns the preparation of certain substituted 3,4-dihydronaphthalenes, and their conversion by catalytic dehydrogenation to the related naphthalenes.

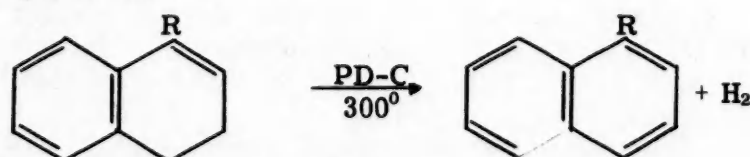
The 3,4-dihydronaphthalenes were prepared from the appropriately substituted 1-tetralones and the appropriate alkyl or aryl halides by means of the Grignard reaction. The following general equation represents the reactions that were carried out.



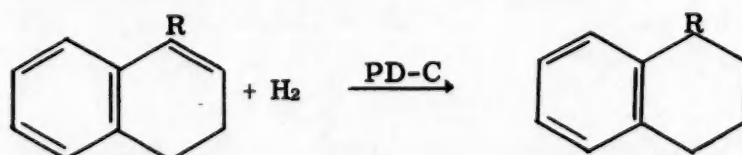
The tetralones were synthesized in the following way.



The 3,4-dihydronaphthalenes were dehydrogenated by heating a mixture of the compound and Pd-C catalyst at 300°.



The 3,4-dihydronaphthalenes were reduced to the corresponding tetralins with Pd-C catalyst.

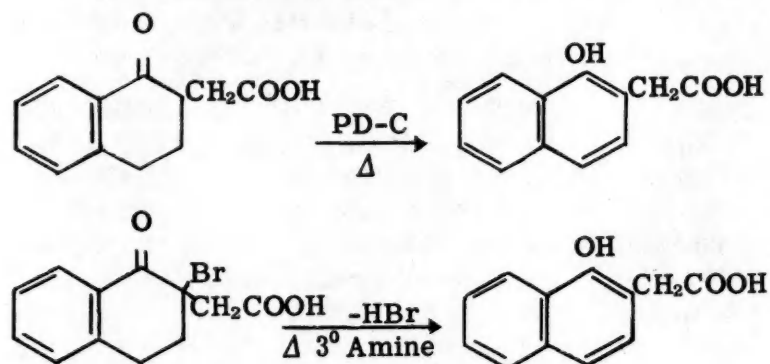


Difficulties were encountered in the purification of these compounds. In almost every case, the usual methods of purification did not yield samples of analytical purity. Chromatography was used with great success in the purification of these compounds.

These compounds, the tetralins, 3,4-dihydronaphthalenes, and naphthalenes constitute several series of compounds varying in type, number and location of

substituents, and degree of saturation. The opportunity to study the effect of these factors on the absorption of ultraviolet light was taken. The results that were obtained in almost all cases were those that would be predicted from the basic hydrocarbon structure in each of these compounds. The shifts of absorption maxima and quality of curves were those that would be predicted from the presence of the various substituents. In a few cases where supposedly anomalous results were obtained, these results could be explained on the basis of the creation of new resonance forms.

The attempted synthesis of several new 1-naphthols with aliphatic acid side chains is reported. Dehydrogenation and dehydrohalogenation of the appropriate 1-tetralone were the methods used.



The poor yields and the poor physical properties of the compounds obtained from 1-tetralone-2-acetic acid indicated that these methods were not suitable for synthesis and the study was not pursued further.

133 pages. \$1.66. MicA54-1501

#### PREPARATION AND ISOLATION OF PEPSITENSIN

(Publication No. 8191)

Donald H. McGlory, Ph.D.  
Vanderbilt University, 1954

Supervisor: Professor Lamar Field

The existence of a pressor substance present in digests of casein with pepsin, first reported by Croxatto and Croxatto, has been confirmed. That the pressor is indeed the product of the enzymatic hydrolysis of casein was demonstrated by the lack of pressor activity after incubation of casein and pepsin separately, under conditions identical with those used for the production of the pressor itself. An active pressor was however, also produced by the action of strong acid alone with casein at reflux temperature. A comparative study of the acid-produced pressor and the enzyme-produced pressor showed the enzymatic product to be superior in activity and appearance; subsequent work was accordingly confined to the enzyme-produced preparation. A method of isolation was developed which yields a product free of depressor materials, and this method was adapted to large scale laboratory production.

The procedure consists of the incubation of casein with pepsin at pH 1-2 for 2 hours, after which the reaction is terminated by saturation with sodium chloride. The salt precipitates unaltered protein, including the enzyme, and large polypeptide frag-

ments. The precipitate is separated by filtration, leaving small peptides and amino acids in the filtrate. A 1-butanol extract of the salt-saturated acid filtrate is concentrated to low volume and chromatographed on an alumina column. The main active peak eluted from the alumina column with water is concentrated, and the pH then adjusted to 9-10 in order to remove base-insoluble material of low activity. The basic solution is brought to pH 5-6 and placed on an Amberlite XE-64 column on the hydrogen cycle. Elution with 0.1 N hydrochloric acid elutes the active material. The acid eluate is neutralized by the addition of Amberlite IR-4B on the alkaline cycle, and the resin is removed by filtration. Lyophilization of the filtrate then yields a white amorphous pressor material with a specific activity of 45 units/mg.; material of this quality was termed pepsitensin. The purification steps, beginning with the 1-butanol extraction, result in a three-fold increase in the specific activity of the pressor in comparison with the crude product of the enzymatic reaction.

The pressor causes graded responses in blood pressure increases when given in graded doses and, when sufficiently large doses are administered, the pressor is capable of eliciting the maximum blood-pressure increase which the vascular system of the test animal is capable of producing.

Pepsitensin contains 12.31% nitrogen, 11.63% chlorine, no phosphorus, and no sulfur. Incubation of the pressor with dilute acid or base for 24 hours at 40° causes no change in activity. Treatment, for a similar time, however, at either elevated temperature or with ultraviolet irradiation results in a marked decrease in activity.

The pressor appears to be completely dialyzable and thus suggests that the molecular weight is, to say the least, less than that of the reactants.

Structural evidence obtained from paper chromatography of hydrolyzed and unhydrolyzed pepsitensin indicates that the pressor factor is a polypeptide consisting of the ten amino acid residues of proline, phenylalanine, leucine (or isoleucine), valine, arginine, alanine, tyrosine, serine, glutamic acid, and aspartic acid. The information derived from infrared spectroscopy also is consistent with the view that the factor is a polypeptide.

90 pages. \$1.13. MicA54-1502

#### THE SYNTHESIS OF SUBSTITUTED $\beta$ -THIENYL- AND $\beta$ -FURYL-GLUTARIC ACIDS

(Publication No. 7573)

Robert Wayne Shelton, Ph.D.  
State University of Iowa, 1954

Chairman: Walter T. Smith, Jr.

A convenient synthetic method has been developed for the preparation of glutaric acids having a heterocyclic substituent in the  $\beta$  position. This method involves the condensation of a heterocyclic aldehyde with two moles of ethyl acetoacetate, using piperidine as a catalyst, to give 24-77% yields of the corresponding ethyl bis-acetoacetates. These new bis esters were hydrolyzed by means of strong alkali to yield a series of new  $\beta$ -substituted glutaric acids in



yields of 52-73%. Certain of these acids will be tested to determine whether they exert any inhibiting action against micro-organisms.

The preparation of the ethyl bis-acetoacetates is illustrated by the following preparation of ethyl 2,5-dimethyl-3-thenylidene-bis-acetoacetate.

2,5-Dimethyl-3-thiophenecarboxaldehyde 14.0 g. (0.10 mole) and ethyl acetoacetate 26.0 g. (0.20 mole) were mixed and 1.0 ml. piperidine was added. Thirty-six hours later the mixture was clouded with water droplets but there was no solid material. It was then placed in the refrigerator for several hours, whereupon it became very tacky, and vigorous scratching with a stirring rod produced, almost instantly, a solid mass of crystals. The cake was then broken up and transferred to a Büchner funnel, where a few drops of liquor were pressed out. The solid was dissolved in 20 ml. alcohol by warming, and after an hour or two the material was filtered off and carefully washed with 5 ml. alcohol. The product was light yellow in color. This material is sufficiently pure for use in preparing the corresponding glutaric acid. A portion was recrystallized from a mixture of 1/3 benzene and 2/3 ligroin, washed with more of the same, and dried to give a pure white product.

The substituted glutaric acids were prepared by the following procedure:

The ethyl bis-acetoacetate, 7.0 g., was dissolved in 50 ml. alcohol, and 50% alkali solution (50 g. sodium hydroxide in 50 ml. water) was added. This mixture was refluxed for one hour, whereupon it was transferred to a 600 ml. beaker with the aid of 20 ml. water, approximately 40 ml. alcohol was boiled off on a hot-plate, and 45 ml. more of water was added and the mixture chilled in ice. One hundred milliliters of concentrated hydrochloric acid was added while the mixture was stirred in an ice bath to maintain the temperature below 50° C. The mixture was then made acidic to Congo red with some additional acid (about 5 ml.) and after chilling was filtered. The solid was recrystallized from water (15-100 ml.).

The time required for solid to form in the bis-ester mixtures varied from a half-day to a half-week. It should be noted, however, that these mixtures exhibit a marked tendency to remain in a viscous liquid state, and in the absence of scratching may deposit no crystalline material for several days or weeks. After the first crop of crystals is removed, the filtrate usually deposits one or more additional crops.

The substituted glutaric acids also show a marked tendency to form super-saturated solutions; chilling and scratching with a stirring rod are often necessary to initiate crystallization.

38 pages. \$1.00. MicA54-1503

## CHEMISTRY, PHYSICAL

### POLAROGRAPHIC BEHAVIOR OF ORGANIC COMPOUNDS: CHLOROACETALDEHYDES, CHLOROETHANOLS AND GLYOXAL

(Publication No. 8271)

Cline Eugene Bennett, Ph.D.  
University of Michigan, 1954

#### INTRODUCTION

The purpose of the work described was to continue the systematic investigation of the polarographic reduction of carbon-halogen bonds, aldehydes and alcohols, and related compounds in order to elucidate the electrode processes and to correlate chemical reactivity and electrode behavior insofar as possible. Of equal interest was the development of analytical methods for the compounds investigated, based on the fundamental studies of electrochemical behavior.

**PART I. POLAROGRAPHIC AND COULOMETRIC BEHAVIOR OF THE CHLOROACETALDEHYDES.** Chloral hydrate gives one apparently diffusion-controlled wave, dichloroacetaldehyde two kinetic-controlled waves and chloroacetaldehyde two kinetic-controlled waves. The chloral hydrate wave is actually controlled by a composite of diffusion and kinetic processes. Coulometric and polarographic data show that chloral hydrate is reduced to dichloroacetaldehyde hydrate; the latter dehydrates and the unhydrated molecule is reduced to chloroacetaldehyde which is then reduced to acetaldehyde; finally, the latter is reduced to either or both ethyl alcohol and 2,3-dihydroxybutane. This overall reduction process forms only one wave; the acetaldehyde whose reduction should result in a second wave, is formed in such a small amount that the wave is only clearly demarcated in ammonia buffers. Dichloroacetaldehyde is reduced to chloroacetaldehyde, which in turn is reduced to acetaldehyde with the formation of one wave; acetaldehyde reduction accounts for the second wave. Chloroacetaldehyde's first wave is due to reduction to acetaldehyde; the second due to reduction of acetaldehyde.

**PART II. POLAROGRAPHIC DETERMINATION OF THE CHLOROACETALDEHYDES.** Polarographic methods have been developed for (a) the determination of any individual chloroacetaldehyde in the absence of the other two; (b) the determination of chloral hydrate in the presence of either or both dichloro- and chloroacetaldehyde; and (c) the analysis of certain mixtures of chloral hydrate and either dichloro- or chloroacetaldehyde. The direct polarographic analysis of mixtures of dichloro- and chloroacetaldehyde cannot be performed since the two compounds give coincident waves in the usual buffer systems. The precision for the determination of an individual chloroacetaldehyde alone or in the presence of others as specified, is about 3%.

**PART III. POLAROGRAPHIC AND COULOMETRIC BEHAVIOR OF GLYOXAL.** Glyoxal gives one polarographic wave in the pH range of 7.0 to 12.4 except in ammonia buffers where an additional wave appears. The waves are kinetically controlled which elimi-

nates use of the Ilkovic equation for calculating the number of electrons involved in the electrode process. Coulometric runs indicate that about three electrons are transferred per molecule of glyoxal which is believed to indicate the average number of electrons involved in the formation of several products. Evidence favors the interpretation of the electrode process as involving a free radical mechanism. The major process is probably the reduction of glyoxal to glycolic aldehyde followed by the reduction of the aldehyde to ethylene glycol, erythritol or both; the two waves merge into one due to the closeness of their  $E_{1/2}$  values. The earlier wave in ammonia buffer is due to imine formation.

**PART IV. POLAROGRAPHIC BEHAVIOR OF 2,2,2-TRICHLOROETHANOL. ACIDIC NATURE OF TRICHLOROETHANOL.** Only 2,2,2-trichloroethanol of the three 2-chloroethanols is polarographically reducible in the potential range of 0 to -2.0 volts. It gives one diffusion-controlled wave in the pH range of 6 to 11;  $E_{1/2}$  shifts to more negative potentials at higher pH values due to acid-anion equilibrium. Coulometric measurement and the Ilkovic equation indicate that two electrons are involved in the reduction process; accordingly, trichloroethanol is probably reduced to dichloroethanol.

**PART V. AN ELECTRON DENSITY RULE FOR CORRELATING EASE OF POLAROGRAPHIC REDUCTION.** Existing theories or expressions for correlating ease of reduction are critically discussed. A rule is proposed for correlating half-wave potentials which states that in a given type of molecule, the reduction of an electroactive group is facilitated as the electron density is decreased about the atom which will be attacked by an electron or electrons from the cathode. This decrease in electron density may be accomplished by many factors, e.g., substitution, orientation of the molecule at the electrode, pH, solvent, background electrolyte, etc.

118 pages. \$1.48. MicA54-1504

#### THERMODYNAMIC STUDIES OF THE MONOHYDROGEN DIFLUORIDES OF THE ALKALI METALS, THALLIUM AND AMMONIUM

(Publication No. 8281)

Glenn Adeen Burney, Ph.D.  
University of Michigan, 1954

Heat capacity measurements have been made on the monohydrogen difluorides of lithium, sodium, rubidium, cesium, thallium, and ammonium over the temperature range from below  $10^{\circ}$  to  $305^{\circ}\text{K}$ . This work has been done in an adiabatic vacuum-type calorimeter constructed in this laboratory. The survey was undertaken on these compounds to augment the meager quantitative thermodynamic data on fluorides, and at the same time, to check for a transition in these compounds similar to the one previously found in  $\text{KHF}_2$  ( $196^{\circ}\text{C}$ ), but, occurring at such a temperature that structural studies would be more convenient. Qualitative studies indicate that a transition exists in  $\text{CsHF}_2$  below  $50^{\circ}\text{C}$ , but higher temperature calorimetric measurements have not been completed.

Heat capacity measurements on sodium monohydrogen difluoride showed two anomalies. These anomalies were in the form of a sharp peak at  $202.8^{\circ}\text{K}$  followed by a hump extending over the temperature range of  $203^{\circ}$  to  $227^{\circ}\text{K}$ . The two anomalies involved a total energy effect of 11 calories (.05 entropy unit). Phase studies and additional calorimetric measurements failed to yield an explanation of these effects.

The heat capacity curves of  $\text{CsHF}_2$ ,  $\text{TlHF}_2$ , and  $\text{NH}_4\text{HF}_2$  all are abnormal in the temperature range  $275^{\circ}$  to  $305^{\circ}\text{K}$ . The heat capacity in this temperature range increases at a considerably greater rate than would be predicted from the lower temperature measurements. The explanation of these effects have not been determined since this will necessitate higher temperature heat capacity data and/or x-ray diffraction studies.

The standard entropies at  $298.16^{\circ}\text{K}$  for the monohydrogen fluorides reported on in this dissertation are:  $\text{LiHF}_2 = 16.96$  e.u.,  $\text{NaHF}_2 = 21.73$  e.u.,  $\text{RbHF}_2 = 28.70$  e.u.,  $\text{CsHF}_2 = 32.31$  e.u.,  $\text{TlHF}_2 = 34.92$  e.u., and  $\text{NH}_4\text{HF}_2 = 27.61$  e.u.

The values of heat capacity and thermodynamic functions at rounded temperatures for the above series of compounds are also reported.

Dissociation pressure measurements were performed on lithium monohydrogen difluoride over the temperature range  $25^{\circ}$  to  $115^{\circ}\text{C}$ . Extrapolation yields a dissociation pressure of hydrogen fluoride equal to 2 mm of Hg at  $298.16^{\circ}\text{K}$  and 760 mm of Hg at  $402.7^{\circ}\text{K}$  over the system  $\text{LiHF}_2 - \text{LiF}$ . The heat of dissociation at  $298.16^{\circ}\text{K}$  equal to  $13.7 \pm 0.3$  kcal/mole and the standard free energy of formation equal to  $3.50 \pm 0.1$  kcal/mole were calculated from the dissociation pressure measurements.

The appendices include: (1) a sample heat capacity calculation, (2) a discussion of the temperature scale, (3) heat capacity measurements on a standard sample of benzoic acid, and (4) a discussion of the magnitude of probable errors in the calorimetric measurements. 108 pages. \$1.35. MicA54-1505

#### A STUDY OF THE PREPARATION AND PROPERTIES OF DICHLORO-DICARBONYL-PLATINUM (II)

(Publication No. 8333)

James Maynard Lutton, Ph.D.  
University of Michigan, 1953

This study was undertaken in an attempt to determine the extent to which idealized orbital configurations determine the structure of molecular species. The square coplanar orbital configuration of divalent platinum complexes was chosen for study, since in this structure, the repulsion energy is greater than it would be in the more symmetrical tetrahedral structure. Many four coordinated complexes of  $\text{Ni}^{++}$ ,  $\text{Pd}^{++}$ ,  $\text{Pt}^{++}$ ,  $\text{Cu}^{++}$ , and  $\text{Au}^{+++}$  have been shown to have the planar structure, but in all cases the interpretation has perforce been somewhat equivocal since lattice effects, solvent effects or intramolecular effects have always provided sources of repulsion



on perpendiculars to the plane of the molecule. (This is a truism for any crystal.)  $\text{PtCl}_2(\text{CO})_2$  should be free of such effects insofar as they originate within the molecule itself and presents a fairly clear case provided it can be studied free of external effects, i.e., either in the vapor state or in a completely inert solvent. According to current theory, this compound should show a trans planar configuration and it gave some promise of permitting study in the vapor state.

Since available preparative methods for  $\text{PtCl}_2(\text{CO})_2$  were relatively useless, it was necessary to carry out an extensive synthetic investigation. In the course of this study, a new, relatively simple preparation of  $\text{PtCl}_2$  from  $\text{PtO}_2$  was developed. Ultimately, a straight-forward synthesis of  $\text{PtCl}_2(\text{CO})_2$  was worked out, using high pressure carbonylation of  $\text{PtCl}_3$ , which gave a yield of readily accessible  $\text{PtCl}_2(\text{CO})_2$ . Because of the great instability of the compound towards heat and moisture, a number of specialized techniques had to be developed.

Since it was found that the thermal instability of the compound would not permit work in the vapor

phase, the dipole moment was measured in benzene solution. This was done by determining the dielectric constant in benzene as a function of concentration, using a heterodyne beat method. From these data was obtained by extrapolation, the value of the dielectric constant at infinite dilution, from which the total polarization could be calculated. The electron and atom polarizations were calculated from the measured refractive index. The orientation polarization and thus the dipole moment could then be calculated, a value of 4.85 Debyes being obtained. This high value supports a cis configuration which is consistent with chemical data. This high value indicates that a tetrahedral configuration, though certainly not excluded, is not very likely. The conclusion that the dicarbonyl has the cis structure in benzene indicates that little could be concluded from a measurement on the vapor. Further, the failure to obtain the trans form under conditions which should have produced only this form, indicates that CO does not show a strong trans effect, as is generally supposed.

95 pages. \$1.19. MicA54-1506

## ECONOMICS

### ECONOMICS, GENERAL

#### GRIEVANCE ARBITRATION IN THE AUTOMOBILE INDUSTRY: A COMPARATIVE ANALYSIS OF ITS HISTORY AND RESULTS IN THE BIG THREE

(Publication No. 8317)

George Butler Heliker, Ph.D.  
University of Michigan, 1954

This is an analysis of the grievance arbitration systems established by the collective bargaining Agreements between the UAW-CIO and General Motors, Ford, and Chrysler. The purpose of the investigation is: (1) to trace the development of grievance arbitration in the automobile industry, against a background of its most pertinent historical antecedents in the clothing industries and the controversies concerning the institution in American industry generally; (2) to compare and analyze selected parts of the systems of "industrial jurisprudence" which have evolved out of the thousands of arbitration decisions in these firms; (3) to ascertain the essential differences of philosophy, method, and content of decisions, among the three systems; (4) on the basis of this analysis, to evaluate the relative effectiveness of the three systems in terms of their adequacy as a final step in the grievance machinery and in terms of the development of the total collective bargaining process; (5) to predict possible future developments, and to suggest modifications of the existing systems in order better to integrate arbitration into the collective bargaining process and to promote stable and democratic industrial government in the industry.

The study includes an exhaustive survey of

published materials concerning the history and problems of grievance arbitration; a careful examination of documentary materials relating to the development of the institution in the automotive "Big Three;" and a careful analysis of arbitration decisions and opinions on certain selected subjects common to all three jurisdictions. The latter fall into three main categories: (1) general principles of interpretation; (2) rules relating to the grievance and Umpire procedures; (3) principles governing disciplinary action.

Investigation along these lines reveals that the arbitration systems were, in each company, indispensable to the survival of collective bargaining and have all contributed immeasurably to peaceful industrial relations in the industry. But the investigation also discloses significant differences among the three systems individually, but especially between that in Ford as against those in General Motors and Chrysler. The Ford system is shown to be much more closely related to the total labor-management relationship, to have relied more upon a mediatory and less upon a judicial approach, to have permitted much easier access to arbitration, to have evolved a more flexible "industrial jurisprudence," and to have given much more guidance to the development of the collective bargaining process. It is an important conclusion of the study that the Ford system is superior to the others with regard both to its past results and its future potential for assisting the evolution of a more cooperative relationship between the UAW and Ford Management. It is also concluded - tentatively and with recognition that available evidence is insufficient for confident prediction - that the General Motors and Chrysler arbitration systems cannot survive in the long run without adopting at least some of the characteristics of the Ford system.

431 pages. \$5.39. MicA54-1507

# THE BALANCE OF PAYMENTS OF THE SOUTHEAST IN 1950

(Publication No. 8320)

Gloria June Hile, Ph.D.  
University of Michigan, 1954

One approach to the study of the economic structure of a region within a country is to construct a balance of payments for the region similar to that constructed for an individual country. While the necessary data for the construction of a balance of payments are collected for this purpose by the national governments, this is not the case for regions within a country. The primary purpose of this dissertation is, therefore, to devise methods of constructing a balance of payments for a region in the face of a paucity of data.

The first three chapters present general background material. Chapter I considers the scope and importance of regional economics as well as the different possible approaches to the study of a region. Methods are described which deal with both the structure of the region itself and its relations with other regions. The balance of payments concept is discussed in detail in Chapter II, including definitions of the terms employed, a description of the usual form, and a discussion of its use in economic analysis. Chapter III deals with a general description of the region chosen for this study, the Southeast, with respect to its natural resources, population, agriculture, industry, level and distribution of income.

The main body of the dissertation lies in Chapter IV, where the estimating procedures used to set up a regional balance of payments are discussed in detail. In general, all relevant data have first been collected. The main sources of data are United States Government publications but other sources, too numerous to mention, are used as well. A great deal of calculation has been necessary to make the data, collected originally for different purposes, consistent. Quantities for which no direct data could be found are estimated by using relationships to known quantities for which theoretical justification can be given.

The balance of trade is obtained from estimates of regional production and consumption and from estimates of the interregional shipments of goods by different methods of transportation. The service items include: freight and shipping charges; education; insurance; property income; recreation and travel; and private unilateral transfers. They are estimated, for the most part, by taking the difference between total receipts and expenditures for each item. The capital account consists of the transactions of the Federal Government in the region and private capital movements. The latter are estimated indirectly by obtaining the net change in assets and liabilities over the period (the savings) of individuals, unincorporated businesses, corporations, and state and local governments in the region. Due to the lack of data, gold and currency movements and errors and omissions are found as residuals or balancing items.

Four balances of payments for the region in 1950

are presented in the final chapter, where the results are interpreted. The different estimates arise from variations in the treatment of certain conceptual problems, specifically, whether the residency of corporations is defined on the basis of the location of home office or operating establishment, and whether the Federal Government is treated as a resident of the region or as an outsider. All estimates show a surplus on current account for both goods and services and a capital export, though of varying amounts. These results would seem to indicate that the South, usually thought of as an underdeveloped area and therefore assumed to be a debtor, has reached the stage of development where it is a creditor in the sense of repaying debts. The reader is warned against taking these results for one year as indicative of a trend but it is felt that they do reflect the position of the region in 1950.

215 pages. \$2.69. MicA54-1508

# AN EVALUATION OF NORWEGIAN POST-WAR WAGE POLICY, 1945-1950

(Publication No. 8131)

John Christian Norby, Ph.D.  
University of Minnesota, 1954

From 1945 through 1950, the Norwegian Federation of Labor pursued a national wage policy known as the "solidarity wage policy." The objective of the policy was to effect a leveling of living conditions by (1) reducing the differentials in average hourly earnings among workers in mining, manufacturing, agriculture, and forestry; and (2) by increasing "social wages" to particular groups of workers.

The objectives of this study were: (1) to ascertain the effectiveness of the solidarity wage policy by analyzing changes in the wage structure and appraising the effects of certain social legislation; and (2) to attempt to establish the reasons for the changes in the wage structure.

The criteria chosen to estimate the effect of the solidarity wage policy on the wage structure were: (1) the change in the absolute and percentage differentials of average hourly earnings in the various industries from the mean of all industries; and (2) certain statistical measures of the distribution of wages in 1945 and 1950.

Analysis of changes in the inter-industry wage structure indicated a small amount of leveling in the wage structure of adult men and a greater amount for adult women. The data indicated appreciable success in narrowing the differential between the average hourly earnings of both adult men and women in industry, and in agriculture and forestry. Analysis of the data showed a leveling in earnings between skilled and unskilled workers in industry and in the trades, and between men and women. A thorough analysis of changes in geographical differentials could not be made because of insufficient data.

Social legislation caused a leveling of living conditions between the various classifications, benefitting the low-paid workers more than the high-paid workers,



the workers of northern provinces more than the workers of the southern, and rural workers more than urban workers.

The reasons for the changes in the wage structure were classified into three groups: (1) controlled cost-of-living increases; (2) controlled basic contract revisions and Wage Board decisions; and (3) uncontrolled changes in average hourly earnings, which have been called the "wage glide."

The flat cost-of-living increases tended to narrow the differentials between the various categories. Some of this type of increase were for equal amounts for men and women, which tended to reduce the monetary differential between them.

Basic contract revisions caused the workers in the poorly-paid industries to receive larger increases than the workers in the better-paid industries. By collective bargaining, slightly larger increases were secured for women than for men. An analysis of fifty percent of the Wage Board decisions showed that the direct effects of the decisions were, generally, consistent with the solidarity wage policy.

In an attempt to explain the uncontrolled changes in average hourly earnings, wage movements (adult men) in thirty-nine industries in mining and manufacturing were analyzed by correlating the changes in productivity per man-hour, labor costs relative to product value, changes in the scope of piece rate method of wage payment, variations in employment, increases in the degree of unionism and the type of product market with changes in average hourly earnings. The conclusion was that changes in productivity per man-hour, the broadened scope of incentive methods of wage payment, and favorable product market conditions explained the major portion of the differential movement of the inter-industry wage structure. Labor cost ratio to product value had no appreciable influence. The effects of the variations in employment and of a continuous and uniformly high degree of unionism were indeterminate.

134 pages. \$1.68. MicA54-1509

#### THE POPULATION, INDUSTRY, AND INCOME OF VIRGINIA

(Publication No. 7980)

Robert Wacker Paterson, Ph.D.  
University of Virginia, 1953

The Population, Industry, and Income of Virginia purports to show changes which have taken place in the population, agricultural and manufacturing establishments, and in the distribution of income among the people of the State in recent years. As a basis for comparison data relating to both the South and the United States have been analyzed. The study is therefore somewhat broader in scope than the title indicates.

Chapter I concerns the inhabitants of Virginia. The direction of settlement, rate of increase, and resource utilization are factors that have largely determined levels of living. The distribution of the population between rural and urban centers and

changes in the distribution are considered to be reflections of agricultural technology and manufacturing development. Fluctuations in the size of the rural-farm population are seen as indicating the extent of economic opportunity outside of agriculture. Finally, regional changes in the gross population of Virginia are described and variations in population density among the regions are explained.

Population composition and characteristics are analyzed in Chapter II. The lack of stimulation from foreign-born residents in Virginia and the South is noted. The relative decline in importance, from a numerical point of view, the Negro population in Virginia and the South is also shown. Recent changes in sex and age composition and their effect upon population growth is summarized. The tendency of population in the United States to "grow older" is emphasized. The distribution of population by age group and residence classification and the effect of the distribution on dependent age groups is considered on a sectional basis.

The extent of migration and routes of migration are analyzed in Chapter III. Emphasis, however, is placed upon qualitative measures so as to determine the effect of migration on the population of Virginia. Measures of white and Negro migration as well as by residence classification are used in determining the influence of migration in equalizing population pressure.

In Chapter IV the agriculture establishment of Virginia, the South and the United States is assayed. Comparison between the three areas are made in terms of land in farms, number and size of farms, farm capital, and farm tenure arrangements.

The character of agricultural production in Virginia is the subject of Chapter V. A brief survey of agricultural land use as of 1940 sets the stage for an analysis of crop production, livestock production, livestock products, and forest products development in Virginia. Income from farm marketings and changes in the source of income since 1924 is reviewed. Adjusted income figures were computed to offset recent changes in the value of the dollar and to determine the growth of real income among agricultural producers in recent years. The development of mechanization and its slow infiltration into the South is described. The effects of mechanization upon farm enterprises and ultimately upon income through productivity gains is viewed as a benefit to Virginia.

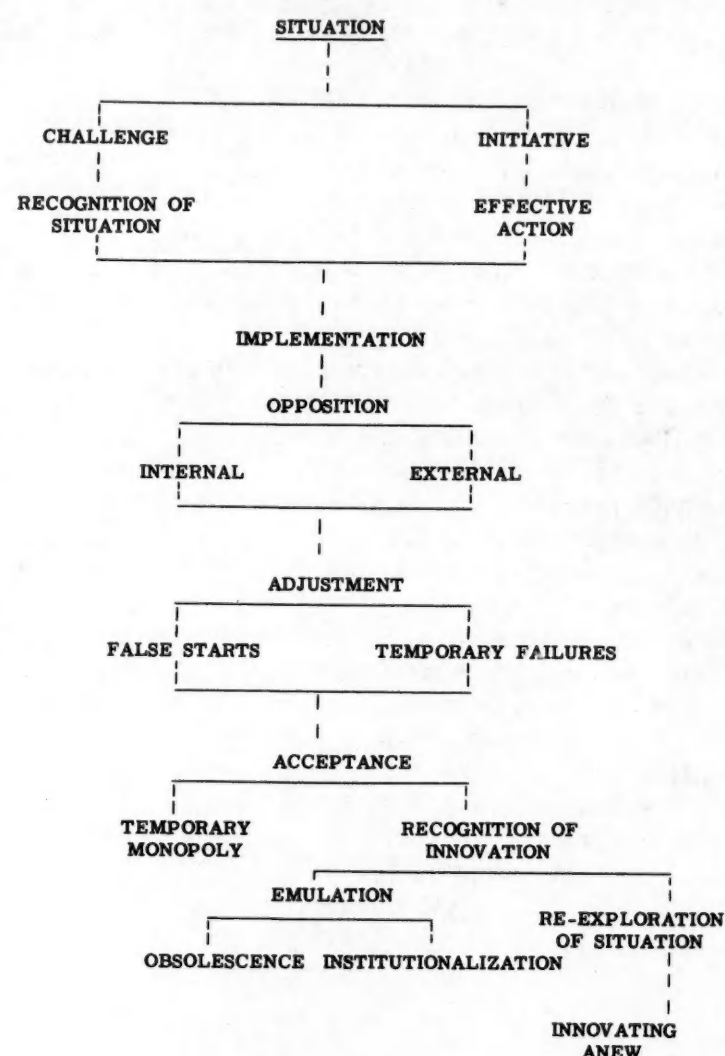
The gradual transition that has occurred from agriculture to manufacturing is described in Chapter VI. The transition involves a proportional decline in the employment of agricultural workers and an increase in manufacturing employment. Differences in demand conditions and in the economic characteristics of production between agricultural and manufactured products are discussed. Thus, the relative decline in the number of opportunities for farm employment and the increase in job opportunities in manufacturing especially since 1940 is pointed out. This fact, it is believed, is largely responsible for giving southern residents a choice, for the first time, between agriculture and other work.

Chapter VII includes a historical summary of the

development of manufacturing in Virginia from colonial days to the present time. The effects of plantation agriculture, slavery, the cotton gin, and the Civil War caused manufacturing in Virginia and the South to be retarded. Since 1900 manufacturing growth has been rapid in the South and Virginia. However, Virginia's share of certain national growth characteristics has not increased as has been true of the South. But Virginia's manufacturing enterprises have become more diversified in recent years and establishments have been increasing in the less urbanized areas of the State.

The structure of manufacturing in Virginia is considered in Chapter VIII. Demand conditions for producer's and consumer's goods are analyzed and stability of production of the various classes of manufactured goods is considered. With this background the 20 industry groups listed for Virginia in the 1947 Census of Manufactures are surveyed. Comparisons are made in value added per production worker and average wages between Virginia and the United States in each of the industry groups and according to type of production goods. Future development prospects are pointed out in relation to competitive features of other areas.

Changes in population and production characteristics noted in the first eight chapters are emphasized in Chapter IX which concerns recent trends in income. Per capita income and important sources of income in recent years are analyzed and Virginia's income gains are compared with those of the United States and the southeast. 270 pages. \$3.38. MicA54-1510



## ECONOMICS, COMMERCE — BUSINESS

### RECENT INNOVATIONS IN RETAIL MASS-MERCHANDISING

(Publication No. 8336)

Edward Malcolm Barnet, Ph. D.  
Columbia University, 1954

This doctoral dissertation is concerned with expanding understanding of the function of retailing in our economy and with grasping insights into the catalytic role of innovation. "Innovation" is used here to mean "a novel complex of ideas, their implementation, and their economic acceptability. Innovations may take the form of a process (as in the case of the Bessemer process for steel making), or a retail institution (such as the department store or supermarket), of a facilitating method (such as pre-packaging, telephone-ordering), or of a device (such as the vending machine). Innovations are not merely new inventions; they are the resultant of new inventions adjusted to application-in-use whose success is not merely emulated but transforming to previously existing relationships. By the injection of newly discovered components into an existing situation, there is a restructuring of parts so that a new pattern

results. The value of parking lots adjacent to stores is not merely an addition to the usefulness of stores; it invites a new concept: "the shopping center."

The "creative destruction" (Schumpeter) implicit in innovation describes the metabolism of our body economic and evokes the necessity for regarding our production-distribution system as an organic whole instead of as fragments whose productivity may be measured in parts. In retail mass-merchandising we see a meshing and re-shuffling of the functions of producer, distributor, and consumer, resulting in the new phenomenon of "continuous flow" (Knauth). The mass-merchandising institutions emerging to play their part in this process are: the mail order house chains of stores, the chains of department stores, supermarket chains, manufacturers' retail chains, and others.

Although the final aim of more effective merchandising is increased sales, the primary focus of merchandising is to make it easier for the customer to buy, to reduce the search-effort for information about alternative items, to assist in a favorable evaluation of items by scientific planning of the products, their selection, presentation, display and service concomitants. To foster the selection of the most suitable items, convenience of location, ease of selection, confidence in the sustained reliability of products and their vendors, financial ease in purchasing — all these focus on facilitating the performance of the buying function.



Most of the value-added-by-retailing may be considered in terms of those actions which facilitate: (1) establishing feelings of need, (2) searching for information of alternative methods of filling need, (3) evaluating multiple needs, (4) decision-making, (5) negotiation, (6) purchase, and (7) routinization of purchasing. The combinations and permutations of devices and methods for facilitating these seven activities have resulted in an aggregation of facilitating functions which in combination constitute institutions which are themselves innovations.

Non-price factors facilitating consumer buying acquire the mantle of "innovation" by virtue of the fact that they are accepted in sufficient measure to justify their economic existence. Those retailer-manufacturer relationships behind the scenes of retailer-consumer relationships are also examined for their implications for the process of innovating continuous production-distribution techniques which promise the emergence of still newer institutional forms and point to new ways for both manufacturers and retailers to contemplate their relationships in terms of their "axis-life" as well as their "orbit-existence."

A summary chart may suggest the sequence of factors apparently involved in the process of innovating: (see preceding page).

432 pages. \$5.40. MicA54-1511

COMMODITY FLOW INTERCONNECTIONS  
WITHIN THE UNITED STATES AS  
REFLECTED IN THE CARLOAD WAYBILL  
ANALYSES OF THE INTERSTATE  
COMMERCE COMMISSION, 1949-1950

(Publication No. 7957)

Jere Walton Clark, Ph. D.  
University of Virginia, 1953

With a view toward studying certain aspects of the market structure and economic interdependence of communities, this quantitative study of the state-to-state data in the Interstate Commerce Commission Carload Waybill Analyses was made to determine the spatial (geographic) range of rail commodity movements within the nation, 1949 and 1950. The waybill data constitute a one per cent random sample of all carload shipments by Class I railroads in the United States for each of the years, 1949 and 1950. Besides the state of origination and the state of destination for each reported shipment of each of 260 commodity classes and five commodity groups, the number of tons and carloads of freight and the average distance of haul were selected from the available data for purposes of this study.

The commodity flows were first considered for the nation and then for seven individual states: Alabama, California, Colorado, Michigan, New York, Rhode Island, and Virginia. These states were selected on the basis of peculiarities in size, product specializations, location, and population structure.

Frequency distributions of the freight for the nation and for each of the states were formed for both years to describe the proportions of selected commodity group traffic which were shipped various distances. Distributions were also formed from the national data to show the nature and range of variation of the 260 I. C. C. commodity classes when classified according to the average length of haul, the median length of haul, and the proportion shipped more or less than a specified distance. Most of these distributions are presented graphically as well as tabularly in order to facilitate comparison and description.

Some of the more important findings and implications of this study are as follows:

1. A community typically provides a large part of its economic livelihood. Its dependence on other regions consists primarily of a need for sales outlets for its product specializations and for a source of supply of the essential commodity specializations needed from other regions. Hence the specializations of one region seem to complement those of other regions. Generally the greater the distance separating two communities, the smaller is the number of commodities exchanged between them and the smaller is the amount of each commodity exchanged.

2. The empirical findings of the study impose a severe restriction on the idea of a "market region," or economic area, as being delimited by a definite geographic "boundary line." While two commodities seldom have the same average length of haul, each of two or more states or regions sometimes has the whole nation as its "market area." These findings give operational content to the idea of describing the market structure of an economic system in terms of statistical density functions.

3. Most of the distributions studied in this investigation appear to have a more or less characteristic form and appear to be reasonably stable from one year to the next, thereby suggesting the possibility of fitting a theoretical distribution. An effort in this direction has already begun. Professor Rutledge Vining has shown that the Logarithmic Normal distribution approximately fits some empirical railway traffic distributions. The writer, at Professor Vining's suggestion, has done some preliminary experimentation with the Gibrat distribution with a view toward "improving the fit" of the Logarithmic Normal distribution. Although progress toward this specific goal has been limited, the experimental work suggests that future research directed toward fitting a theoretical distribution to the data may prove to be very fruitful.

165 pages. \$2.06. MicA54-1512

# MARKETING ASPECTS OF CONSUMER BEHAVIOR ANALYSIS

(Publication No. 7559)

Abdel Aziz El-Sherbini, Ph.D.  
State University of Iowa, 1954

Chairman: Wendell R. Smith

From a marketing viewpoint, present theoretical structures designed to explain consumer behavior are not quite adequate. This inadequacy has been reflected in two important phenomena: first, unexplained shifts in consumer demand, and second, inability to predict consumer expenditure behavior in a manner satisfactory to the marketer.

These two weaknesses call for some revisions of consumer behavior analysis to conform to the facts of marketing. This has been the primary objective contemplated in this study. Accordingly, the study was divided into three major parts:

1. A study of some of the important hypotheses advanced as partial explanations of consumer behavior. This involved an examination of the theoretical background of each hypothesis, its contributions and limitations, and its implications for marketing.

2. A consideration of the impact of marketing activities on consumer purchasing behavior. Attention was focused on the thesis of a "sold" consumer as accounting for a large part of upward shifts in consumer expenditures. Purchasing behavior patterns were also studied as an integral part of buying decisions, and as an area of consumer behavior in which marketing activities play an important role. Finally, a market-oriented theory of consumer behavior was suggested and was found to be supported by empirical results. According to this theory, the consumer engages in aggregative sorting with a view of maintaining or extending his assortment of potentials for behavior during some relevant future period. This assortment provides a range of capacities which is designed to enable the consumer to maintain desired patterns of behavior in the future.

3. An attempt to improve upon present techniques of predicting consumer expenditures. This involved a statistical analysis of discretionary and non-discretionary purchasing power at multiple levels and a comparative analysis of the results obtained by conventional techniques and those arrived at by suggested techniques. This was followed by a study of the techniques used in analyzing the influences emphasized by the various hypotheses considered in the first part of the study. Finally, emphasis was placed upon the possibility of improving prediction by taking cognizance of some suggested techniques of analyzing interregional and international differences in consumer expenditure behavior, and of recent developments and contributions provided by market analysts in the measurement of consumer behavior.

476 pages. \$5.95. MicA54-1513

# THE LEONTIEF INTERINDUSTRY RELATIONS ANALYSIS: AN APPRAISAL OF THE POTENTIAL APPLICABILITY OF INPUT-OUTPUT METHODS IN BUSINESS FORECASTING

(Publication No. 8307)

Wallace William Gardner, Ph.D.  
University of Michigan, 1954

The primary purpose of this study is to examine the position which the Leontief interindustry data and methods may occupy in the framework of economic information and analytic techniques which are available to business management for application to forecasting problems. A secondary purpose is to present, as simply as possible, the essential features of the interindustry approach with the aim of encouraging a wider understanding of this area of quantitative analysis among students of business management.

The procedure is followed of describing the nature of the forecasting problem facing the management of a modern business enterprise, followed by a review of the forecasting methods and techniques presently in use. The interindustry relations method is described and a discussion of its advantages and deficiencies is presented.

It is argued that the sales estimate, the cornerstone of business planning effort, would be greatly facilitated if the analyst were better able to trace through the economy the indirect influence of the final demand upon related processing sectors. The general approach of evaluating the effect of predicted changes in the economy external to the given sector through the use of historical relationships which may be found to exist between the activity in the industry and one or more of the measures of aggregate economic activity leaves much to be desired. The analyst can have only the most elementary understanding of the paths of influence through which the projected changes in national aggregates may affect his industry. The interindustry data serve the purpose, not only of furnishing a basis for improved judgment in translating estimates concerning general business conditions to a meaning in terms of the individual sector, but also, through use of the inverse of the matrix of input-output ratios, of making possible the use of a large mass of economic data without exceeding normally available research resources.

It is further shown that the usefulness of the interindustry methods is dependent upon the position of the individual industry relative to final demand. The interindustry data and methods tend to be least effective in the analysis of demand in the case of those sectors whose product flows principally to final demand sectors and most effective in the case of those sectors whose product must pass through many other sectors before reaching final demand.

143 pages. \$1.79. MicA54-1514



THE UNITED STATES' NATIONAL  
ECONOMIC POLICY AND THE  
ALUMINUM INDUSTRY, 1889-1951

(Publication No. 7969)

Hugh Kyle Hawk, Ph.D.  
University of Virginia, 1953

The purpose of this study was to discover the relationship between the United States' national economic policy and the aluminum industry. Specifically the question to be answered was: What were the effects of such policy, as implemented over time, on the aluminum industry and in turn on the utilization of resources and the supply of aluminum available for consumption?

The study was divided into appropriate chronological periods from 1889 to 1952.

The United States' national policy fell into three phases. Our initial policy was implemented by patent protection and the tariff schedules. Patent protection for the aluminum industry expired in 1909. During World War II new national measures were developed. The most important of these measures were the Lend-Lease Program and direct governmental development of domestic aluminum productive capacity. Since the outbreak of the Korean War, the United States has embarked on an "incentive program" for private firms to undertake further expansion of aluminum productive facilities.

Within each chronological period a careful analysis was made to determine the effects, if any, of the national economic policy then prevailing on the cost-price structure of the industry, the shifts in output, expansion of productive facilities, and the relationship of the domestic producer or producers to foreign producers or the Canadian producer.

Finally, a limited projection of consumption - production data to 1975 was made. Attention was then focused on the desirability of a closer relationship between the development of the Canadian and United States productive facilities in order to insure ourselves against future shortages of aluminum, especially in the event of war.

Before World II, the United States' patent system and the tariff schedule enabled the Aluminum Company of America to develop as the sole domestic producer of aluminum. Owing to this protection, this firm was able to maintain higher prices than otherwise would have been the case. The high profits earned in these circumstances enabled the Aluminum Company of America to buy up the richest and most accessible bauxite deposits in the United States and some sources of hydroelectric power.

During World War II the United States' national economic policy, as implemented by several new measures, greatly expanded aluminum production capacity both here and in Canada. As a result, the domestic industry was no longer solely one producer - ALCOA - but became the "Big Three." From the viewpoint of economic theory, the industry had passed from monopoly to homogeneous oligopoly. Our analysis showed that ALCOA became the price-leader of this oligopoly. ALCOA's price-leadership was (and

is) in part owing to its close business association with ALCAN of Canada.

Since World War II, and especially since the outbreak of the Korean War, measures taken by government officials to implement the United States' national economic policy for aluminum have secured a limited expansion of productive capacity by the established domestic firms. However, analysis showed that these measures failed to attain their original objectives. In addition, this study indicates that it is doubtful whether any new dependent producer can be induced to enter the domestic aluminum industry without direct government subsidies.

The long range outlook, as reflected by estimates in Chapter IX, is for a continuing strong increase in the consumption of aluminum. And, owing to the relatively higher domestic cost of production these increases in demand for aluminum, in the long run, could be met more cheaply with aluminum supplied by producers in Canada.

On the basis of the foregoing, these recommendations for future United States' national economic policy were made:

1. Complete elimination of every tariff schedule for bauxite, alumina, and aluminum ingot.
2. The formulation of policies for the development of ore facilities in the Caribbean region and for the development of new reduction capacity in Canada.
3. Severing of financial connections between ALCOA and ALCAN by the Department of Justice where possible.
4. Formulation of policies to enter into arrangements with Canada to insure a future supply of aluminum from this source for our domestic consumers.

425 pages. \$5.31. MicA54-1515

REPORTING FOREIGN OPERATIONS

(Publication No. 8318)

Samuel Richard Hepworth, Ph.D.  
University of Michigan, 1954

It is the purpose of this study to examine the problems related to the expression in dollars of the financial position and operating results of foreign subsidiaries of United States corporations with particular consideration of the impact of government control of currency convertibility and exchange rates.

The first section includes an investigation of the appropriate methods for the translation of accounts initially expressed in a foreign currency into dollars. Separate attention has been given to balance sheet as compared with income statement accounts and the measurement of the gain or loss resulting from exchange rate movements has been examined in detail. In the second section the forms and purposes of government control of currency convertibility and exchange rates have been examined with particular emphasis on the impact of controls on the reporting of the financial position and operating results of foreign subsidiaries. The final section considers the desirability of incorporating the financial statements of foreign subsidiaries with those of United States

corporations in consolidated financial statements. The possibility of employing partial or hybrid consolidation methods in order to give special recognition to foreign net assets and earnings is illustrated by reference to published financial statements.

It was concluded that foreign currency accounts which represent a fixed number of foreign currency units should be expressed in dollars by application of the exchange rate which is in effect on the date of the translation, and that real value assets should be translated by use of the acquisition date exchange rate. Foreign currency revenues and expenses should be expressed in dollars by application of the exchange rate in effect when the respective amounts were earned or incurred, but as a matter of practical expediency the use of month-end rates is acceptable. It is essential that the translation of foreign currency revenues and expenses result in a reasonably accurate measurement of the exchange gain or loss as the change in the dollar value of foreign currency money value net assets.

Restrictions on the convertibility of the foreign currency into dollars for transmission to the United States have no necessary impact on the translation of foreign balances or the recognition of foreign earnings. Only if the real effect of such restrictions is to limit the freedom of administration of the assets of the foreign subsidiary should recognition by the parent corporation of unremitted subsidiary earnings be considered to be improper. When a foreign country has a number of exchange rates in effect at the same time, the rate which is applicable to financial remittances should be employed for translation purposes. It was concluded that the devaluation of a foreign currency represents the adoption of a new currency unit and the pre-devaluation rate should be abandoned for the translation of foreign currency accounts.

The propriety of the inclusion of the accounts of foreign subsidiaries in consolidated statements depends upon the existence of effective control of the affairs of the subsidiary and a reasonable degree of homogeneity of operating characteristics between parent and subsidiary. The impact of exchange restrictions on the effectiveness of parent company control must be considered, but the existence of controls must not be considered to represent sufficient evidence to require exclusion of foreign subsidiary accounts from consolidation.

289 pages. \$3.61. MicA54-1516

## ECONOMICS, FINANCE

### AN ECONOMIC ANALYSIS OF THE FEDERAL TAXATION OF INCOME FROM COOPERATIVE ENTERPRISE

(Publication No. 8287)

Lorne Douglas Cook, Ph.D.  
University of Michigan, 1954

This study is designed to investigate the problems of taxing, at both corporate and personal income levels, the gains from those participator-financed businesses known as "cooperatives." Although cooperatives differ from proprietary corporations in their method of allocating earnings to owner-members, cooperatives in the United States exist, as do other business organizations, to make profits for their owners. They are, however, either largely exempt from the corporate income tax or are permitted to exclude from taxable income any net revenue subsequently distributed to owner-patrons on a basis of patronage. This gives rise to a question of equity in the application of the corporate income tax. In this study the question of whether the gains from cooperative enterprise, however, distributed, should be taxed as corporate profits is approached, first, by way of an analysis of the nature of entrepreneurship in cooperative organizations, and, second, by an evaluation of the claim of cooperative spokesmen that cooperatives are, in fact, nonprofit associations.

The first part of this study is devoted to an historical resume of the development of cooperatives and of the philosophy of cooperative enterprise. This is followed by a description of the operational procedures employed by American cooperatives and of the income tax laws relating to cooperatives. With this background an economic analysis is undertaken of the role of cooperative member-patrons as owner-enterprisers of a profit-seeking business. The gains from cooperative enterprise are found to be in the nature of corporate profits, which, although they are distributed according to patronage, accrue to member-patrons in proportion to investment and entrepreneurial risks undertaken. It is further shown that cooperatives have none of the important features typical of organizations which are traditionally considered to be nonprofit associations. On grounds of equity, therefore, it is concluded that gains from cooperative enterprise should properly be taxed as corporate profits.

The remainder of the study is devoted to exploring several possibilities for equitably taxing cooperative profits. From this exploration it is concluded that no method so far devised would succeed in fully applying an absolute corporate income tax to the gains from cooperative enterprise. Any plan to apply an absolute corporate income tax to cooperative profits must take account of the fact that cooperatives do not deal at arm's length with member-patrons. Since gains from cooperative enterprise are distributed in proportion to patronage, cooperatives may, to a large extent, eliminate their taxable margins by inaugurating a policy of trading with member-patrons at cost. This



problem would disappear with respect to farmer, as distinct from consumer cooperatives, if the corporate and personal income taxes were to be integrated. It was assumed, however, that the corporate income tax will continue to be an absolute tax as at present; the recommendations for the taxation of cooperative profits advanced in this study are designed, therefore, to improve the present tax treatment of cooperatives rather than to make that treatment perfectly analogous to that of proprietary corporations. Among the more important of these recommendations are: (1) that the present policy of exempting certain farmer cooperatives be discontinued, and (2) that cooperatives be restricted to excluding from gross income only those amounts paid to member-patrons in cash or cash equivalent.

359 pages. \$4.49. MicA54-1517

#### THE DISTRIBUTION AND DISPOSITION OF HIGHWAY FUNDS IN VIRGINIA

(Publication No. 7963)

Rudyard Byron Goode, Ph.D.  
University of Virginia, 1953

One of the basic tenets of economics requires some sort of maximizing behavior. The manifestations of this aspect of human nature are apparent in business and personal affairs; but in the public sector of the economy, few cases of maximizing are delineated. Undoubtedly, the lack of a suitable yardstick precludes much objective effort along this line. But this difficulty should not negate attempts to increase total benefit from public expenditures. One of the problems facing individuals and businesses is also common to units of government. That is choosing the appropriate pattern of expenditures which provides the maximum satisfaction, income, profits, benefits, etc.

This study represents an inquiry into one aspect of the expenditure of state highway funds in Virginia. The particular facet considered was the allocation of funds with its two interdependent elements: distribution (geographic dispersal) and disposition (functional use). In the approach to this study of a public expenditure program, a detailed history of Virginia's highway administration and development from 1906 to 1953 was presented. Then the sources of state highway funds were traced from their inception to their present status. Following this background, the allocation methods, past and present, were described and analyzed.

Since the State Highway Commission and the Department of Highways took over most of the county roads in 1932, a logical breakdown for the analysis suggested itself. First, the allocation methods prior to 1932 were studied. Here the changes were related to the pertinent conditions ranging from the entry of the State into highway affairs through the development of a State highway system of nearly 9,000 miles. Then, with the passage of the Secondary Road Act, a new road system was created and municipal grants were inaugurated. The methods of distributing funds

to the three systems were traced over the twenty year period ending with the 1951-52 fiscal year. Throughout this period statutory requirements prescribed the essential framework for the allocations but typically the State Highway Commission was responsible for the development and use of the apportionment formulae. As a means of integrating the three different patterns, the current overall allocative pattern was described, analyzed, and appraised. On the basis of this analysis and appraisal, some recommendations were submitted which it is felt would enhance the total public benefit resulting from the expenditure of highway funds.

Among the recommendations were the following: (1) An objective guide removed from the ever-present political pressures is needed in determining the relative amounts of funds devoted to each road system. (2) There exists a need for some sort of equalization program for the Secondary System. This was proposed in the Twenty Year Plan but was not effected. (3) The transfers of mileage between the two road systems should be continued to insure classification corresponding to use. (4) The factor of road use may need to be included in the Primary System allocation formula. Further research would reveal the desirability of this change.

Finally, a major change was suggested which the writer feels would alleviate many of the present problems of Virginia highway administration. This proposal would require the establishment of a continuing state-wide survey to reveal highway needs. From such a survey priorities for improvement could be obtained; and in turn, annual improvement programs could be easily determined on an objective basis. The major difficulties center about the measurability of highway needs and popular acceptance of such a planning system. It is believed that such a program, if well implemented and administered, could assure the optimum use of the State's highway funds.

438 pages. \$5.48. MicA54-1518

#### ECONOMICS, HISTORY

##### ASPECTS OF THE ECONOMIC DEVELOPMENT OF BROOME COUNTY, NEW YORK: 1900-1951

(Publication No. 8181)

G. Ralph Smith, Ph.D.  
Syracuse University, 1954

This study is primarily an evaluation of significant aspects of the economic history and growth of Broome County for the years 1900 to 1950. The 710 square miles of Broome County, which is located in the Southern Tier of New York State, constitute the Binghamton metropolitan area. In 1950 the population of the county was approximately 184,000. The main urban areas are the City of Binghamton, the villages of Johnson City and Endicott and the Town of Vestal.

This particular county was selected for study because its economy, in contrast to all of the counties immediately adjacent to it, changed in the years following 1900 from one primarily agricultural in nature to one possessing a high degree of industrialization.

As a background for this study, the nature, character and importance of the county's agriculture, industry and transportation facilities during the 19th century are described.

Once this 19th century setting is made, the use of agricultural land during the first half of the 20th century in the contiguous New York counties of Delaware, Chenango, Cortland and Tioga is described and compared to similar activities in Broome County. Serious consideration is given to reasons why dairy farming emerged as the principal type of farming and the main source of agricultural income in Broome County. Several suggestions are offered as to ways of broadening the use of rural land in Broome County by improved agronomical practices, more capital investment and reforestation.

A large portion of the study is devoted to the origin, physical growth, financial history, market position, marketing practices, labor relations, employee benefits, community relations and the nature of the management of the Endicott Johnson Corporation, the International Business Machines Corporation, and the Ansco Division of General Aniline and Film Corporation. These firms are the principal sources of manufacturing employment in the county. Endicott Johnson and International Business Machines are also the principal exponents of the welfare capitalism which continues to be the most unique economic aspect of the county.

George F. Johnson of Endicott Johnson and Thomas J. Watson of International Business Machines were the two men mainly responsible for the magnitude of the industrial development within the county. Illustrations of the nature of their thinking on economic matters and, in particular, labor relations are drawn from their public utterances and writings.

The county's labor market is described with particular attention being paid to sources, stability and volume of manufacturing employment and to the level of employee earnings. In addition, the extent of collective bargaining agreements and the general nature of union-management relations within the county are described and analyzed. Reference is made to the restrictions on labor mobility produced by the above-mentioned welfare capitalism.

The effect of the industrial development upon the growth of population as well as the prospects for future population growth are presented.

The new Broome County Airport, a municipal facility placed into service in May, 1951, and the airlines utilizing it are described. Particular attention is paid to the value of the services these airlines render and the possible effect the airport may produce upon the economic growth of the county.

A final chapter briefly reviews the problems inherent in studies of economic growth. The economic future of Broome County is analyzed in qualitative terms and conclusions are drawn about the nature and character of the agriculture, industry and other business

activities the county may expect to have in the years to come. 622 pages. \$7.78. MicA54-1519

## ECONOMICS, THEORY

### FACTORS DETERMINING CASH AND/OR TOTAL CURRENT ASSETS OF INDUSTRIAL CORPORATIONS: A STATISTICAL STUDY

(Publication No. 8334)

Mildred Laverell, Ph.D.  
University of Pennsylvania, 1952

Supervisor: Simon Kuznets

The two principal questions under investigation are: (1) What factor, or factors, namely items on balance sheets and/or income accounts, is closely associated with the level or size of cash balances and/or total current assets held by industrial corporations at a point in time? (2) Does the same factor, or factors, account for the changes taking place in cash balances and/or total current assets over time?

The method of approach used is an intercompany cross-section correlation analysis of cash and/or total current assets held as of an instant of time, and of changes in total current assets over time, in three different industry groups - electric light and power, drugs, medicines and cosmetics, and iron and steel.

The problem and previous studies are described in Chapter I. Background for the correlation analysis of the problem is given in Chapter II: in that chapter, the data used are described; the hypothesis for the relationship existing between cash and the principal determining factor, operating expenses, is formulated, and; a simple statistical presentation of ratios is given as a preliminary step to the later application of the correlation technique to the problem. In Chapter III, the hypothesis that the level of cash held by different companies within an industry group is determined by the amounts of operating expenses incurred by the companies is tested. Chapter IV analyzes the relationship between changes in operating expenses and changes in total current assets over time.

The results of the analysis may be summarized as follows: (1) Operating expenses seems to be an important determinant of intercompany differences in the amounts of cash and/or total current assets held by industrial corporations in normal years, depression years, or war years. (2) Operating expenses, however, does not account for the changes taking place in total current assets over time.

The second result suggests two possibilities: either (1) percentage changes in total current assets over the short periods of time studied are not determined by rational decisions, and therefore an explanation of them in these terms is impossible, or (2) if they are the result of rational decisions on the part of management, the factor that does determine the percentage changes in total current assets over time has not been located. 96 pages. \$1.20. MicA54-1520



## EDUCATION

### EDUCATION, GENERAL

#### A STUDY OF FEDERAL ASSISTANCE TO FEDERALLY AFFECTED SCHOOLS WITH SPECIAL ATTENTION TO THE STATE OF VIRGINIA

(Publication No. 7959)

Louie Reid Davis, Ed. D.  
University of Virginia, 1953

To aid school districts affected by Federal activities, Congress in 1950 enacted Public Law 874. This law was designed to assist Federally affected schools in meeting current operating expenses. The writer has attempted to make a critical study of the Federal assistance program provided by Public Law 874.

The basic sources of information used in the study were: Congressional hearings, Congressional reports, The Congressional Record, Federal statutes, bulletins and reports of the United States Office of Education, studies of professional organizations, standard textbooks a questionnaire, and personal conferences with school officials.

The historical background of Federal assistance to education was considered under two headings: (1) Federal assistance to war congested schools, and (2) provisions for the education of children living on Federal reservations.

It was found that Federal legislation providing for the education of Federally connected children tended to be sporadic and piecemeal. By 1949 Congress had given authority to some dozen Federal agencies to provide for the schooling of Federal dependents. The laws authorizing the various Federal school programs differed widely in their provisions.

A survey conducted by Congress in 1949 showed that there was a very definite need for a comprehensive Federal assistance program to aid Federally affected schools. It was found that Federal activities had imposed two basic types of burdens on school districts: (1) The Federal Government in the course of World War II acquired extensive tracts of land, thus reducing the local tax base used for school support, and (2) Federal activities generally caused sudden and substantial increases in school enrollments in Federally affected districts.

An analysis of the provisions of Public Law 874 indicated that the law was compatible with most of the major principles of Federal-State relations in education. The one exception noted was the fact that Federal agencies are permitted to operate certain post schools. The practice of Federal operation of schools is contrary to the recommendations of all national advisory organizations of professional educators.

The replies of 103 school officials to a questionnaire study indicated that the Federal assistance

program under Public Law 874 has been reasonably effective in meeting the administrative needs of Federally affected schools. The majority of the respondents considered that the Federal aid was adequate and that the over-all administration of the program was satisfactory.

Certain inequities in the Federal assistance program were noted. States providing a high ratio of state aid are severely penalized since Federal assistance is based on the local contribution rate. Furthermore, there is no guarantee that Congress will pay full entitlements, even after such entitlements are duly certified. Also, the eligibility requirements for aid would appear to be too great in the case of districts suffering sudden Federal impacts.

321 pages. \$4.01. MicA54-1521

#### A STUDY OF THE NEED FOR VOCATIONAL EDUCATION FOR HIGH SCHOOL GRADUATES IN SOUTHERN ILLINOIS

(Publication No. 8250)

Alice Phillips Rector, Ed. D.  
Washington University, 1953

The purpose of this study was to show the need for vocational education and guidance for high school graduates as revealed by a study of graduating seniors in selected high schools in southern Illinois, of the seniors' reasons for their vocational decisions, of their desire for vocational and educational counseling and training, and of the seniors' aptitudes as revealed by scores on the "Differential Aptitude Tests" by Bennett, Seashore, and Wesman.

Three methods were used to obtain information for the study: (1) after a pilot study, a questionnaire was administered to 1,962 seniors in thirty-eight high schools in the southern sixteen Illinois counties and their adjacent areas, (2) a questionnaire containing data on the school programs was returned by school officials of the thirty-eight cooperating schools, (3) the "Differential Aptitude Tests" battery was administered to approximately 1,124 seniors in twenty-three of the thirty-eight schools in the study.

The main findings, based on the responses of 1,962 seniors to the questionnaire, are as follows:

1. Seniors had made three major types of vocational and educational plans: approximately one-third had planned for some type of post-high school vocational or educational training; one-third had not considered additional vocational preparation beyond high school before full-time employment; one-third of the seniors were undecided about their future after high school graduation.

2. Seniors had made a particular educational plan for two main reasons: they desired to secure

specialized training, or they desired to prepare themselves for a better way of life. The respondents gave four leading reasons for the choice of a vocation: interest, personal satisfaction to be derived from the vocation, belief in ability to achieve success in a vocation, and influence of a third person. Seniors gave two main reasons why they did not plan to attend college: lack of interest and lack of ability.

3. Thirty-nine per cent of the high school seniors indicated a desire for vocational counseling. Twenty per cent of the seniors expressed a desire for short-term vocational training programs or vocational training integrated with employment after high school graduation.

According to findings revealed by the test scores of 1,124 seniors on the "Differential Aptitude Tests," the following may be stated:

1. The mean scores of the seniors in southern Illinois were significantly lower than national means on all the tests with two exceptions - the mean scores of the girls compared favorably with the national means on the Clerical Speed and Accuracy Test and the Language Usage - Spelling Test.

2. The mean scores of the seniors who planned to receive college or university training were higher on all the tests than the scores of seniors making other plans, with the exception of students who planned to enroll in a business school. The latter had higher mean scores on the Clerical Speed and Accuracy Test and Language Usage - Spelling Test than did the seniors anticipating college or university training.

3. The mean scores of seniors who planned to leave the area for university training were significantly higher than the seniors who planned to enroll in the area university.

4. The mean scores for seniors planning to enroll in a trade school were higher on the Mechanical Reasoning and Space Relations Tests than for the total group.

5. On the tests related to academic work - the Verbal Reasoning, Numerical Ability, and Abstract Reasoning Tests - sixteen per cent of the group planning to secure a higher education scored below the mean of the non-college group, while twenty-one per cent of the non-college group scored above the mean of the seniors planning for college.

6. According to the results of these tests, a large number of seniors had chosen occupations in relation to their aptitudes. On the other hand, a number of youth would probably achieve greater success if they had chosen occupations different from their preference stated on the questionnaire.

183 pages. \$2.29. MicA54-1522

# A STUDY OF TEACHER-GRADUATES OF FLORIDA STATE UNIVERSITY FOR THE YEARS 1951 AND 1952

(Publication No. 8260)

Ivey Mitchell Wade, Ed. D.  
Florida State University, 1954

## Purpose

The purpose of this study was to survey the 1951 and 1952 Florida State University graduates who completed the regular program for the preparation of teachers to determine: (a) general characteristics of teacher-graduates; (b) occupational and geographical distribution; (c) teaching situations filled; (d) graduates' appraisal of their preparation for teaching and their recommendations for strengthening the program of teacher-education; (e) differences reported between internship and teaching experience and between preservice expectation and inservice experience; and (f) data on graduates who did not enter teaching.

## Procedure

A questionnaire was prepared and submitted to 797 graduates of Florida State University. Responses were received from 690 graduates, 86.6 per cent. Additional data were obtained from University records.

## Major Findings

a. There was a tendency for graduates to intern and begin teaching in communities of about the same size as those in which they last attended high school. Almost half came from families in which one or both parents had attended college. More than half came from families in which there were three or more children.

b. About 70 per cent of the teacher-graduates entered teaching the year following graduation. Most of those leaving teaching did so because of family responsibility and military service. More secondary than elementary teachers taught out of their area of certification, however more elementary than secondary teachers taught grades or subjects they had not planned to teach while in college. About 40 per cent began teaching in their home community; secondary teachers traveled further than elementary teachers and men traveled further than women. The proportion of graduates who came from out-of-state and that began teaching out-of-state was about the same. About 50 per cent of the 1951 teacher-graduates planned to teach during 1953-54.

c. Nearness to home was the most frequently reported reason for teaching in a particular school. Most reported no community-imposed restrictions on teachers that were not imposed on other equally reputable members of the community. The teachers reported regular church attendance but less than half participated in community adult group activities or worked with youth groups out of school. Almost all reported considerable teaching freedom and three-fourths reported agreement with the educational philosophy of the school in which they taught.



d. The most frequently reported gap in college preparation for teaching was in teaching methods. This was reported more by elementary than by secondary teachers and those with one year of experience than those with two years of experience. Graduates recommended more practical preparation, reorganization of general courses in education, and more classroom observation preceding internship.

e. Increased responsibility, greater personal satisfaction, and improved attitude of pupils were the greatest differences reported between internship and teaching experience.

f. A larger proportion of men than women of secondary than elementary teacher-graduates did not enter teaching. About half of the non-teachers planned to enter teaching at some future time.

#### Major Recommendations

a. That a continuous and systematic program of follow-up of teacher-graduates be initiated.

b. That teacher-recruitment efforts be intensified at the college level.

c. That internship come before the last semester of the senior year and be preceded by a period of planned observation.

d. That general courses in teacher-education be studied with the view of making them more interesting and meaningful to prospective teachers.

318 pages. \$3.98. MicA54-1523

#### DIFFERENCES IN ADJUSTMENT OF STUDENTS AT EVANSVILLE COLLEGE ACCORDING TO TYPES OF HOUSING

(Publication No. 8156)

Everette Leroy Walker, Ed. D.  
Indiana University, 1953

Director: Louis G. Schmidt

#### Problem

The major problem was to determine the significant differences in adjustment between groups of students at Evansville College according to various types of living arrangements. The six areas of adjustment investigated were as follows: academic, emotional, social, vocational, home, and health. Students lived in three types of housing and were identified as commuting, rooming, and local groups.

#### Methodology and Procedure

Out of the 850 students enrolled in Evansville College during the Fall Quarter of the 1952-53 academic year, 310 students were invited to participate in this research. These students were selected because they lived in one of the three types of housing and were single, white, American, non-transfer, and non-first-term students. The number responding to the invitation was 285, which represented 92 per cent of the eligible group. From the students actually participating, the local group was the largest of the

three, representing 68.4 per cent; the rooming group was next in size with 16.9 per cent; and the commuting group was smallest with 14.7 per cent. Males represented 74.4 per cent of the total group.

The three instruments administered for this study were: the Mooney Problem Check List, the Bell Adjustment Inventory, and a Personnel Information Questionnaire. Data regarding derived I. Q. scores, Lee-Thorpe Occupational Interest Inventory scores, grade point averages, high school ranks, and college classifications were secured from cumulative records.

The data were then tabulated according to types of housing, sex, and college classification. Most of the materials were of a numerical nature and were treated statistically by computing means, standard deviations, standard errors of the means, standard errors of the difference of the means, and *t* ratios. The null hypothesis was then sustained or rejected. If the *t* ratio was as large as 2.58 or larger, the difference was considered "very significant" and the null hypothesis was rejected at the one per cent level of significance. When the *t* ratio was 1.96 or larger the difference was considered "significant" and the null hypothesis was rejected at the five per cent level.

This study used primarily the definition of adjustment which emphasized the state, the subjective reactions, or the attitudinal concept. It was recognized that there were other areas of adjustment besides the six employed and that all the factors of those used could not be determined; therefore, each area was delimited to include certain specific factors.

#### Findings and Conclusions

Inferences drawn from the study were conditioned by the reliability and validity of the data used and were limited to the students included in the study.

1. In general, commuting students reflected the best state of adjustment according to the Mooney and the Bell while the rooming students seemed to be in a less adequate state of adjustment as measured by these two instruments.

2. When all the data were considered, local students reflected a better adjustment than commuting or rooming students.

3. From the data available, it was impossible to determine whether commuting or rooming students had the least adequate adjustment.

4. The greatest differences were found between the commuting and rooming groups.

5. Commuting students reflected better academic and emotional adjustment.

6. Local students reflected better vocational, home, and health adjustment.

7. Rooming and local students seemed to have better social adjustment than the commuting group.

8. The rooming and local students were most alike in the social area while the commuting and local students were most alike in the home area.

9. Male students seemed to have the best adjustment in the emotional, social, and health categories while the female students had the best adjustment in the academic, vocational, and home areas.

10. Seniors consistently reflected better adjustment than freshmen although sophomores and juniors frequently presented varying patterns.

11. The smallest differences between the groups were in vocational adjustment while the greatest differences were in the emotional and social areas.

234 pages. \$2.93. MicA54-1524

## EDUCATION, ADMINISTRATION

### SERVICE CLUBS: THEIR RELATIONS WITH PUBLIC SCHOOLS

(Publication No. 8301)

Lloyd Ellis Fales, Ph. D.  
University of Michigan, 1954

This study has two main objectives. 1) The determination of the nature and extent of public relations practices now existing between service clubs and the public schools of their communities. 2) The desirability of these and other practices as reflected in the opinions of service club presidents and public school superintendents. This relationship is important in developing that phase of public school relations which concerns community groups and in presenting information which may be mutually beneficial to service clubs and public schools in developing their future relational policies.

Examination of service club literature and educational writings provided the basis for the establishment of seven areas of consideration. A. - Educators as members of service clubs. B. - Service Club Activity in Public Education Projects. C. - The Service Club as a Public. D. - The Service Club as a Provider of Tangible Support. E. - The Service Club as a Provider of Intangible Support. F. - Service Club Contact with Youth. G. - Reciprocal Aid from Public Schools to Service Clubs. These areas in turn became the basis for two survey instruments. The first of these furnished data relative to the existence of certain practices between service clubs and public schools. The second measured the desirability of these and other relations as reflected in the opinions of service club presidents and public school superintendents.

The survey universe was delimited to presidents of Michigan service clubs of the Lions, Rotary, and Kiwanis federations and to superintendents of Michigan school systems. From this universe, a random one-quarter sample was drawn and data obtained through mail distribution of the above survey instruments. A response was obtained from ninety-two percent of the sample thus furnishing data on twenty-three percent of the total universe. These data were compared on the factor of community size when total groups of superintendents and presidents were considered. The opinions of superintendents were internally compared on the additional factors of service club membership and administrative experience. Opinions of service club presidents were internally

compared on the additional factors of federation represented and length of club's existence. Opinion and practice were compared on the compatible factor of community size. Statistical treatment of data revealed significant variation as it exists in each comparison.

Three general conclusions may be drawn from this study. 1) Both service club presidents and public school superintendents desire strong relations between their respective groups and generally accept proposals designed to strengthen such relations. 2) There is a very definite agreement between superintendents and service club presidents in each of the population strata as to the relative desirability of specific proposals; these proposals are discussed in detail in the dissertation. 3) There is strong indication that service club - public school relations are more prominent and may be expected to develop more strongly in communities between 2,500 and 20,000 population. 185 pages. \$2.31. MicA54-1525

### FROM COMMUNITY COLLEGE TO UNIVERSITY: INTERRELATIONS OF CERTAIN SELECTED ADJUSTMENT FACTORS

(Publication No. 8309)

Edward George Groesbeck, Ph. D.  
University of Michigan, 1954

The purpose of this study was to ascertain the characteristics and the academic progress of students who began their liberal arts studies in Michigan community colleges and continued them in the College of Literature, Science, and the Arts of the University of Michigan and to determine what relationships existed among certain factors in their adjustment in higher education.

The data were obtained from the applications for admission with advanced standing as submitted by 192 students and their junior colleges, from interviews with the students who were still in the University, from responses to a questionnaire submitted to those who had left the University, and from the academic records of the students concerned.

It was found that practically all of the transfer students suffered a substantial drop in grade point average from community college to that of the first semester of University work. This set-back was quite unexpected by the students, the academic pace set by the University coming as a surprise. After some acquaintance with the University type of instruction (lecture system, greater importance of final examinations, keen competition) considerable recovery was made, and about three-fourths of the 192 students (who transferred in the Septembers of 1951 and 1952) either graduated, withdrew in good standing (C or better), or were still in the University at the conclusion of the writing of this study in March 1954.

Over one-fourth of the students in the study group would not have been admitted to the University directly from high school because of weak secondary



school records. At the end of the first University semester nearly three-fourths of the ineligible-to-enter-directly-from-high-school students' grade point averages fell within the range of the lowest one-fourth of the eligibles.

Not much relationship was found between the amount of credit transferred and the first University semester grade point average.

The most frequently mentioned reason for going to junior or community college rather than going directly to senior college or university was to save money. The students also liked the friendly atmosphere of the smaller institution but disliked its "high-schoolishness." They were pleased with their good grades but indicated that they would have appreciated a more rigorous approach to higher education during the first years in college. The community college personnel were, as a group, overly optimistic with regard to the probable success of their students in the University.

The students welcomed the break with the familiar social routine in the home town. The reverse was found in the area of religious life; the home church holding the loyalty (the junior college not entering into the picture very much) while in the University, the students liked the freedom of choice and the facilities available, but were less satisfied with the new situation.

Academic development, acquaintance with new attitudes and ideas, learning tolerance, socialization, development of self-confidence, and the realization of personal independence and responsibility were named by the students as ways in which the University was beneficial. Conversely, they mentioned the pressure of competition which they thought to be detrimental, creating selfishness, undermining self-confidence, and causing discouragement. In criticism, some students pointed out that the University, being so large, was impersonal and that poor advising and teaching resulted. They stated that some of the rules and restrictions were irksome and that the competition for grades was disconcerting.

They liked most of all the University's cosmopolitan yet friendly atmosphere, the great academic facilities, the cultural advantages, and the services of good instructors who were authorities in their fields.

328 pages. \$4.10. MicA54-1526

#### PROGNOSTIC VALUES OF FRESHMAN TESTS USED AT VIRGINIA STATE COLLEGE

(Publication No. 7984)

Walter Nathaniel Ridley, Ed. D.  
University of Virginia, 1953

The problem of this study was to determine the prognostic values of standardized tests which are regularly given to freshmen at Virginia State College and to suggest ways of improving the uses of these tests for prognostic purposes. In the study answers were sought to such questions as:

What test scores have been thought by freshman advisers to be most valuable for prognosis in specific major fields at Virginia State College? How closely are the advisers within fields and from field to field agreed on those values?

Which test scores have proved to be most valuable for prognostic purposes in specific major fields?

How do the statistically estimated prognostic values of these scores compare with values assumed by freshman advisers for these tests?

What combinations of test performances yield the best estimates of success in specific fields?

How can the efficiency of prediction of success in the various major fields at Virginia State College be improved?

May prediction of student success in major fields be sufficiently improved by use of the test results to justify their continued use?

The subjects used in this study were from the Virginia State College freshman classes of 1947 and 1948. They represented five major fields as follows: agriculture (50), commerce (92), elementary education (95), physical education (74) and biology (62). Thirty-six of these 373 students, for whom there were insufficient data, could not be used. Thus, the final working sample included 337 students from five major fields.

The data used in this study were secured from the registrar's office, the testing service, and from faculty freshman advisers at Virginia State College. The results of students' performances at the beginning of the freshman year on the Otis Quick-Scoring Mental Ability Tests, the Iowa Silent Reading Tests, and the Iowa High School Content Examination served as the bases of prognosis. There were six results for each student (all called scores or variables in this study) including I. Q., reading grade level, and science, mathematics, English, and social science percentiles. Grade point averages earned by the subjects in all courses taken in pursuit of the major indicated the criterion, success in the major. Faculty advisers' estimates of ranks and correlations were written by these advisers on a data sheet.

Procedures in this study included:

Choosing the sample.

Obtaining scores of students on tests.

Obtaining from each freshman adviser his estimate of the rank and amount of correlation existing between each test score and student success in his specific major field.

Obtaining grades of students from registrar's office.

Analyzing the data through computation and use of ranges, ranks, means, standard deviations, coefficients of correlation (including simple, partial, and multiple regression statistics of the zero, first, and second order), simple and multiple regression equations, and appropriate measures of sampling errors.

Making comparisons.

#### CONCLUSIONS

1. There were found individual variations in the prognostic values of the six tests used for the guidance of freshmen at Virginia State College. An order on the basis of their values was established.
2. The six tests used by freshman advisers at Virginia State College for guidance of freshmen can contribute somewhat to prediction of success in each of the five major fields in this study.
3. Each one of the six tests yielded a correlation as high as 0.50 with success in at least one major field.
4. A rank order was established among the five fields in reference to the above values of all tests for prediction of success in these fields.
5. Partial and multiple correlations between tests and success in the major fields rendered higher correlation values than the zero-order correlations in several instances.
6. Differences among individual freshman advisers in their estimations of the prognostic values of the six tests were considerable.
7. Difference between the various groups of advisers in their estimates of the values of specific tests for prognostic purposes was considerable.
8. Difference between the estimates of advisers and the statistically determined estimates of the values of the scores on the six tests for prognostic purposes was considerable.
9. Advisers' estimates of correlation values were generally higher than statistically determined estimates.

Recommendations in this study include:

1. That a program of education be initiated for freshman advisers at Virginia State College to improve their use of the results of freshman tests in their advising.
2. That certain multiple regression equations, developed in this study, be used for the prediction of student success in the major fields.
3. That an estimate of the students' overall probable average (using Snedecor's formula for making fiducial inferences about an individual student) be furnished the freshman adviser.
4. That research be continued to extend the findings in fields included in this study as well as into fields not included.
5. That consideration be given to the use of fewer tests and the substitution of other tests in some instances.

243 pages. \$3.04. MicA54-1527

#### EDUCATION, PHYSICAL

##### THE CONTRIBUTIONS 16-MM CINEMATOGRAPHIC TECHNIQUES MAKE TO COACHING FOOTBALL

(Publication No. 8314)

Francis Parks Harrison, Ph. D.  
University of Michigan, 1954

This study is designed to serve three purposes: one, to determine the status of 16mm cinematography among football coaching agenda; two, to appraise the strong and weak points of this type of visual record as a teaching medium and a functional research tool for football; and three, to determine the cinematographic methodology applicable to the coaching of football as indicated by current practices and procedures among a selected list of outstanding individuals in the profession. Initially it is hypothesized that the cinematographic record provides more and superior data than that available from observation, that the use of motion pictures enhances the science of coaching football, and that the game of football is being influenced by the use of cinematographic techniques.

Two major efforts are exerted to obtain information pertaining to these hypotheses. One, a questionnaire, is mailed to seventy-five outstanding members of the football coaching profession. Answers are solicited to questions regarding the history, philosophy, filming, and use of 16mm motion pictures of football. And two, a tape-recorded, verbal record, a written record, the public address account, and a motion picture record of four regular season games are obtained and compared for accuracy, consistency, content, and intrinsic value to coaching practices. Each of these efforts is oriented within the framework suggested by the author's experience during ten years of sports cinematography and by interpolations from the many excellent written sources of information regarding cinematography, both general and specific. In choosing questions to be included in the questionnaire, these thoughts are foremost: how are football coaches making their football films or having them made; how are they using the finished product, how valuable do they consider the films, and why did they commence filming their football games. In analyzing the film record, the written record, and the tape-recorded records of the four games, every effort is made to reduce this information to its most practical form and to consolidate those items which would provide the most easily usable teaching media. The fact that every item of information contained in the tape-recorded and the written records is collected by football coaches during the course of a game provides strong substantiation for its authenticity and for the completely practical aspects dictated by the need of the moment. The inadequacy of the two records both as to content and to accuracy when compared with the film record leaves no doubt regarding the value of arresting action for further and detailed inspection. Comparisons among the three records



demonstrates with clarity and conviction that observers cannot compete with the motion picture lens either in accuracy or in detail.

It may be concluded that the cinematographic record, when properly made, provides more and superior data than those available from observation. By arresting action too rapid for careful inspection and holding it for prolonged contemplation the cinematographic record provides the coach with facts, not surmise, on which to base his coaching program and thus helps transport the science of coaching football from the realm of conjecture to the realm of fact, from the subjective to the objective. Finally, it is the majority opinion of thirty-five outstanding football coaches that the game of football itself is feeling the influence of cinematographic techniques and is re-arranging itself in accordance with these newly recognized data.

299 pages. \$3.74. MicA54-1528

#### EDUCATION, PSYCHOLOGY

##### THE EFFECTS OF FAILURE IN EXAMINATIONS ON THE PERSONALITY STRUCTURE

(Publication No. 8280)

Stanley Bull, Ph. D.  
University of Michigan, 1954

In this study attention is focused upon the possible cost of failure, in terms of personality deterioration, to the students who sit for rigid elimination examinations. The problem is one of major importance in many countries and communities where highly selective examinations are used, and where it is not considered reprehensible if fifty per cent or more of the candidates fail. The practice of selecting the good from the bad, the better from the good, and the best from the rest, by means of high percentage of failure, is tested to see if it is innocuous.

An examination given by the Board of Education in Jamaica offered facilities for the consideration of this problem. The experiment called for the giving of a personality test to about four hundred children two or three weeks before they sat for this particular government examination. A time interval of five months elapsed before the same personality test was given to 316 available children out of the 400, and these had learned three weeks previously of their success or failure in the examination referred to. The data obtained for the success and failure groups, numbering 203 and 113, respectively, are examined with respects to ranges, distributions, and standard deviations of total scores. Comparisons are made between the two groups, and also coefficients of variability and correlations are introduced to test for differences. There is a final, and more detailed analysis of twelve individual traits. Data drawn from students' written statements to prepared questions are also statistically analysed.

The experiment has failed to discover any general adverse effect on the personality structure resulting

from the traumatic experience of failure in this examination. The detailed analysis of the twelve individual traits gives some indication of compensatory behaviour, and support for believing there is compensation is obtained from the students' written statements.

The null hypothesis, that a climactic experience of failure in an important examination does not interfere with the personality structure, still stands, at least as far as general effects are concerned. The psychological impedimenta, hypothecated by the writer as due to the traumatic effects of failure, either do not exist, or are too deep seated to be revealed by a general personality test of the type used in the experiment.

91 pages. \$1.14. MicA54-1529

##### THE SIGNIFICANCE OF THE REVERSAL ERROR IN READING

(Publication No. 8295)

Elizabeth Monroe Drews, Ph. D.  
University of Michigan, 1954

The specific purpose of this study was to discover whether or not the reversal error was of any special significance as an indicator of a specific reading disability. Certain writers have presented the idea of a specific reading disability syndrome and held that it could be identified by excessive reversal tendency and differentiated from other conditions of poor reading. Others have held that no special significance need be attached to the error, that such errors occur among all children at certain developmental stages. The original plan was to make a critical review of the literature in an effort to find answers to these questions. However, the review of the literature raised more questions than it answered. Therefore, two investigations were planned to provide more complete answers.

The problem of determining the validity of the assumption that the reversal was an indicator of special reading disability was experimentally studied by taking a random sample of children who were non-readers. Records of 108 non-readers, selected from a group of 750 poor readers, were studied to determine whether or not non-readers meeting any of the particular descriptive requirements of specific reading disability would make an excessive number of reversal errors. Children were selected as being non-readers if they were unable to read any material at even the easiest levels without a certain proficiency (a knowledge of at least 95 per cent of the vocabulary). All of these children had one or several of the characteristics that have been related to specific reading disability - mixed dominance, sufficient age and school experience to be termed non-readers, average or superior intelligence, and male sex. Each of these variables was measured in several language functions silent reading, oral reading, spelling and writing by matching on other errors and testing for differences in reversal tendency.

The other major investigation was concerned with the place of the reversal error in the normal



sequence of development of language functions. It has already been pointed out that many writers did not attach any particular importance to the error but instead reported it to be a typical error at a given stage of development. Among questions arising were: At what age levels were reversals common? Did they occur at the same time in all materials? To answer these questions several hundred unselected normal children were tested to determine developmental trends occurring in reversal tendency during the early school years. Various tests of language skill were used, including: a picture-naming test of directional tendency, silent reading and oral reading.

Certain tangential questions, which emerged in the review of the literature, were also answered in terms of the data gathered in the two investigations. Thus, a rather complete description of the reversal phenomena was possible.

Neither the review of the literature nor the investigations offered any support for the concept of a specific reading disability. When reading level or stage of language skill was held constant, no differences appeared between the several groups investigated. That is, laterality, age, intelligence, and sex differences appeared only in a developmental context and only if level of reading or language skill was not held constant. These analyses indicate that a specific reading disability can not be distinguished from other conditions of poor reading by an excessive tendency to make reversal errors. However, the reversal error does play a small, if unimportant, role in the general development of language skills in that all children appear to make these errors at given stages of development.

127 pages. \$1.59. MicA54-1530

**A STUDY OF THE POSSIBLE USE OF THE  
WECHSLER-BELLEVUE SCALE IN  
DIAGNOSIS OF READING DIFFICULTIES  
OF ADOLESCENT YOUTH**

(Publication No. 7960)

Woodrow Flanary, Ed. D.  
University of Virginia, 1953

This study is concerned primarily with the relationship of the psychological functions underlying the eleven subtests in the Wechsler-Bellevue Scale to reading problems of adolescent youth from twelve through sixteen years of age. Ninety retarded and twenty normal readers were used in the study.

The study consisted basically of the following aspects: (1) a discussion of the nature and the concepts of intelligence on which the Wechsler-Bellevue Scale is founded, (2) a resume of the psychological functions tapped by each of the eleven subtests in the Scale, (3) a presentation and analysis of the data secured from the diagnostic measures applied to the retarded and the normal readers, (4) an analysis of the Wechsler-Bellevue scattergrams of the retarded and the normal readers, (5) a comparison of the Composite profiles on the Wechsler-Bellevue Scale for

the ninety retarded readers, the twenty normal readers, and Wechsler's 12-16 year olds, (6) a presentation and interpretation of the clinical findings, as samplings, of sixteen retarded readers and six normal readers, and (7) a summary of the findings of the study and conclusions.

The data collected on the retarded and normal readers came from the following sources: (1) Telebinocular (eye) Test, Snellen Chart (eye) Test, and the American Medical Association Reading Rating Chart; (2) an Audiometer (hearing) Test, (3) Dominance and Visual Imagery Test, (4) Spelling Test, (5) Oral Reading Test, (6) Silent Reading Test, (7) Mental Test (Wechsler-Bellevue Scale), and (8) a Case History record form.

An analysis was made of all the data to determine significant relationships. Over ninety per cent of the retarded readers were found to be below grade in spelling and oral reading ability, as well as in three essential skills in silent reading, namely, rate, comprehension, and vocabulary. The data on dominance indicated that over twice as many retarded readers as normal readers showed evidence of mixed dominance. In the area of vision, the retarded readers gave by far the greater number of abnormal responses, especially in acuity and muscular imbalance at Reading Distance and in suppression, fusion, depth perception, and color blindness.

Eighteen of the ninety retarded readers, according to the Bellevue Scale, were classified as Dull Normal, eleven as Borderline, and two as Mental Defective; forty-five were Average, nine High Average, and two Very Superior. Normal readers ranged in ability from Average to Very Superior.

The study indicated that the Bellevue Scale is a valuable instrument for use in the diagnosis of reading difficulties since it enables the examiner through a quantitative and qualitative analysis of the responses on the subtests to detect the specific psychological functions in which the retarded readers are weak or strong. The study revealed that the points at which the individual subtests on the Bellevue Scale begin to show clear differentiation between the retarded and the normal readers are as follows: Information, 7; Comprehension, 10; Digit Span, 5; Arithmetic, 8; Similarities, 10; Vocabulary, 7; Picture Arrangement, 10; Picture Completion, 9; Block Design, 8; Object Assembly, 9; and Digit Symbol, 8. Approximately fifty per cent of the subtest scores of the retarded readers fell below these points of differentiation, while fewer than ten per cent of the scores of the normal readers did so.

The subtest scores which were found to differentiate most clearly between the retarded and the normal readers were Information, Comprehension, Digit Span, Arithmetic, Similarities, Vocabulary, Picture Arrangement, and Digit Symbol. This may be interpreted to mean that the retarded readers have poor memory function, poor conceptual (abstract) thinking ability, short attention span, weak powers of concentration, meager vocabulary, poor planning ability, and slow psychomotor speed.

331 pages. \$4.14. MicA54-1531



**A COMPARISON OF PHYSICALLY HANDICAPPED CHILDREN AND NORMAL CHILDREN IN THE SAME ELEMENTARY SCHOOL CLASSES WITH REFERENCE TO SOCIAL STATUS AND SELF-PERCEIVED STATUS**

(Publication No. 8304)

Dewey George Force, Jr., Ph. D.  
University of Michigan, 1954

The purpose of this study was to compare physically handicapped and normal children in integrated classes at the elementary school level in an effort to determine the effect of physical disability on social position and self-perception of position among peers.

Subjects were sixty-three physically handicapped children and 361 normal children in fourteen elementary classes from three Michigan public schools providing special services for exceptional children. Data were obtained to test nine specific propositions which said, in effect, that no significant differences would be found between physically handicapped and normal subjects with regard to status among peers, that physically handicapped children would be as well accepted by peers as normal children and would perceive as clearly as normal children what their social position was among peers.

The investigator administered a near-sociometric instrument which revealed choice behavior on friends, playmates, and workmates criteria as well as self-perceptions on the friends and playmates criteria. In addition, information was obtained from the cumulative educational and medical records of the physically handicapped subjects, and the teachers submitted a Study of Group Composition and an Identification Sheet upon which all subjects could be named for outstanding positive and negative behavior traits.

The specific findings were as follow: (1) There was early and general minority - majority subgroup identification based on physical condition of subjects both in choice behavior and in self-perceptions. Physically handicapped subjects (2) received significantly fewer choices than normal children as friends, playmates, and workmates on a disability basis and in approximately half of the intraclass comparisons, (3) guessed a slightly higher mean number of choices as friends and playmates might come to them than did normal subjects, (4) were attributed less power than normal children as choosers but with insignificant differences, (5) were as accurate as normal children in perceiving the numbers choosing them as playmates and somewhat less accurate in perceiving the numbers choosing them as friends, (6) perceived as accurately as normal subjects who their actual choosers as friends and playmates might be, and (7) were mentioned less frequently than normal children by teachers as manifesting either positive or negative behavior patterns or personality traits which might influence status.

The conclusions are that in integrated elementary school classes physically handicapped children hope for acceptance but are not as well accepted as normal peers. This problem exists even in first

grade. Psychological integration is not achieved by mere presence in an integrated class. Early identification of children as normal or handicapped influences all relationships in the classroom. Few physically handicapped children have enough positive assets to offset the negative effect of being labelled as handicapped by normal peers. Cerebral palsy carries the greatest negative social value.

Physically handicapped children want to belong like normal children, but disability complicates the task of gaining social acceptance. The highly accepted physically handicapped child has a rather minor disability of long duration whose presence is largely invisible, and he manifests many socially desirable traits and relatively few negative traits. Real integration is to be achieved through overcoming the prejudices toward the minority group of physically handicapped.

275 pages. \$3.44. MicA54-1532

**THE PREDICTION OF SUCCESS IN FIRST YEAR NATURAL SCIENCE COURSES AT WASHINGTON UNIVERSITY**

(Publication No. 8245)

Fred Junior Giessow, Ph. D.  
Washington University, 1953

Chairman: Dr. Adolph Unruh

The purpose of this thesis was to test the hypothesis that it is possible to predict a student's future performance in first year natural science courses at Washington University on the basis of various factors available from his high school record and scores on the Washington University Scholastic Aptitude test. The five natural science courses studied were Basic Physical Science, General Plant Biology, General Inorganic Chemistry, General Geology, and General Physics.

The data included nine predictors from the student's high school record: Total terms of mathematics; science; total grade points in general science, biology or botany, physics, chemistry, and other sciences; grade point average in all sciences, and in all mathematics; percentile rank at high school graduation; and seven predictors from the scores on the Washington University Scholastic Aptitude Test: Reading, Linguistic, Reasoning, SAT, Quantitative, Perceptual and Mechanical Comprehension stanines. In each course, the criterion was the letter grade earned at the end of the first semester.

The data were transferred to punch cards and the usual machine procedures carried out. Zero order correlations, multiple correlation coefficients, and beta weights were obtained for each course separately. The best two predictors were then selected for each course, and new multiple correlation coefficients and a regression equation for each course were computed.

The best two predictors and the multiple R's for the five science courses were: (1) Basic Physical Science: Reading and SAT stanine, and an R of .67;

(2) General Plant Biology: percentile at high school graduation and Linguistic stanine, and an R of .60; (3) General Inorganic Chemistry: grade point average in high school science and grade points in chemistry, and an R of .62; (4) General Geology: grade point average in high school science, and percentile at high school graduation, and an R of .57; (5) General Physics: Quantitative stanine and grade point average in high school science, and an R of .79. All of these are significant at less than the one per cent of confidence.

The results of this study indicate that the mathematical natural science courses demand and get students who have superior mathematical ability. Whether this ability is a result of their mathematical training in high school or the mathematical training is a result of an aptitude cannot be shown from the results of this study.

The relationship between high school science average and first semester grades in any college science is more significant for chemistry, geology, and physics than for Basic Physical Science and botany. The extent to which the college science grade is a result of the students having studied science in high school as compared to the extent to which students of superior ability elect science in high school and continue it in college cannot be shown from the results of this study.

These results imply that a student's estimate of his own aptitude and abilities in the various areas (Reading, Linguistic, Quantitative, and the like) determines to a very great extent what science course he elects. 104 pages. \$1.30. MicA54-1533

## EDUCATION, TEACHER TRAINING

### THE ROLE OF NON-STUDENT TEACHING FIRST-HAND EXPERIENCES IN SELECTED TEACHER EDUCATION INSTITUTIONS

(Publication No. 7956)

Sterling Grundy Callahan, Ed. D.  
University of Virginia, 1953

The twofold purpose of this study was a) to determine the nature and extent of pre-service first-hand experiences, exclusive of student teaching and teacher internship, in selected teacher-education institutions, and b) to make recommendations with reference to programs of this nature based upon a careful study of related literature and the findings of the investigation.

Responses to an initial questionnaire from 237 institutions throughout the United States indicated that first-hand experience categories were given emphasis in the following order: "Developing Effective Human Relationships", "Developing Overall Professional Competence", "Study of the Child", "Classroom Instruction and Procedures", and "Getting Acquainted with an Individual School". Assigned rank

order, the three individual experiences which were reported as receiving the most extensive use were: "observing and analyzing effective teaching", "observing the classroom activities of groups of children at different grade levels", and "observing instruction on different grade levels as a basis for comparison".

Thirty-six selected institutions among those with the most extensive programs of non-student teaching first-hand experiences responded to a second questionnaire which made inquiry about the organization, administration, and evaluation of such programs. These schools, in the main, were found to vest responsibility for planning experiences in individual instructors, who, regularly correlated experiences with professional-education courses such as "Child Growth and Development" and "Classroom Methods". Typically, first-hand experiences were given greatest stress during the third year, prior to student teaching, through employment of public-school facilities. Prospective teachers were reported as receiving assistance in selecting, analyzing, and appraising first-hand experiences through conferences with instructors, use of guide sheets, and class discussions. Obstacles reported as presenting the greatest difficulty were "excessive teacher load", "lack of facilities", and "finance". Information obtained through visitation to six of the 36 institutions validated, in a large measure, information obtained through questionnaire responses.

After careful consideration of information derived from the literature, questionnaire responses, and visitation to institutions, general recommendations were formulated, in part, as follows: Organizational and administrative responsibility should be delegated to groups of individuals within the staff, who, through employment of democratic procedures, should involve staff members in the planning and conduct of the program. Individual instructors should be responsible for the detailed organization of first-hand experiences within courses. Full use should be made of available staff and institutional, school, and community resources; the campus laboratory school, the summer laboratory school, and the outdoor camp may offer advantages. Students should have access to off-campus as well as on-campus facilities for observation, participation, and teaching in gaining experience in rural and urban as well as traditional and progressive school settings.

The "Study of the Child" should receive greater first-hand experience emphasis than any other category; "Classroom Instruction and Procedures" and the "Study of the School Community" should also be stressed. All professional-education courses should be correlated with first-hand experiences; a core of required experiences may be employed advantageously. There should be a gradual intensification of experiences which reaches a high point with student teaching. Suitable reading procedures should precede observations; group discussions should follow. A guide book concerned with non-student teaching first-hand experiences should be developed to aid both students and faculty. Students should be



permitted to elect a large share of experiences related to their personal needs in consultation with staff members.

The total program should be evaluated at stated intervals by means of devices such as criticism by in-service teachers, written appraisal by students, interviews by counselors, oral class appraisal, and combination student-instructor evaluation. Likewise, the evaluation of student achievement calls for the appraisal of student behavior in educational situations, individual and group discussions, oral reports, written reports, anonymous written evaluations, and problem-solving situations.

552 pages. \$6.90. MicA54-1534

#### A COMPARATIVE STUDY OF TEACHER AND PARENT HEALTH PERCEPTIONS OF CHILDREN IN ELEMENTARY SCHOOL

(Publication No. 8288)

Gertrude Buss Couch, Ph. D.  
University of Michigan, 1954

This study ascertained and compared teachers' and parents' perceptions of health problems in a selected group of fourth grade children. A proportionate random sample of one hundred children in Muncie, Indiana, public schools was statistically selected. Each child's parent and teacher were personally interviewed by means of a health questionnaire. Topics for investigation were (1) nutrition, (2) dental health, (3) sleep and fatigue, (4) vision, (5) speech and hearing, (6) respiratory infections, (7) communicable diseases, (8) skin disorders, (9) accidents, (10) personal hygiene, and (11) other major health problems. Questions were designed to determine (1) perception of salient problems in each category, (2) awareness of other health deviations, (3) expression of concern over problems, (4) report of action taken, and (5) recommendations for reduction of these health hazards.

Recent literature concerning health deviations of school children supplemented by evidence obtained through a pilot study in a nearby city, suggested specific questions included in the instrument employed.

Data obtained were analyzed, frequencies determined, and the significance of the differences between the two groups on responses in each of the eleven categories ascertained by means of Mainland's formula:

$$\frac{\text{Difference Between Two Samples}}{2 \times \text{Standard Error of Differences}} \pm$$

In cases where groups over 20 were compared, Appel's shorter method, using a binomial nomograph, was substituted.

Responses of the two groups were also related to the following factors: for teachers, (1) age of respondent, (2) degree and recency of education, (3) class size, (4) years of teaching experience, and (5) parental status of teachers; and for parents, (1) age of respondent, (2) amount of education, (3) socioeconomic status, (4) family size, and (5) outside employment.

Results obtained supported the conclusions that: (1) teachers and parents have divergent perceptions of children's health problems; (2) teachers, more frequently than parents, feel unable to express any opinion about certain health matters; (3) parents are more aware of problems related to sleep, nutrition, and medical care than teachers; (4) both teachers and parents show relatively little sensitivity to dental defects or accident risks; (5) more difference between parents and teachers is found in action taken or recommended than in sensitivity to health deviations; (6) parents frequently demonstrate undue reliance on school health appraisals; (7) working parents evidence no less awareness or concern over health conditions than nonemployed parents; (8) parents of only children express no more anxiety over health problems than parents of large families; (9) little difference is evidenced in health perceptions of teachers who are parents as compared to those who are not; and (10) differences often reflect limitations inherent in parent and teacher roles.

Implications of this study for the improvement of teacher education and parent education in the health area are discussed and recommendations are made.

584 pages. \$7.30. MicA54-1535

#### THE PRECONCEPTIONS OF PROSPECTIVE TEACHERS

(Publication No. 8232)

Harold Scott Ferguson, Ed. D.  
New York University, 1953

It was the purpose of this study to determine what if any expectations or preconceptions were held by four hundred prospective teachers concerning the conditions and experiences which they would meet during their first year of teaching. It would also determine one year later from those of the original respondents who had taught that year, what their reactions were to the actual conditions and experiences. The respondents were volunteers from five teacher education institutions: the School of Education of New York University, and the State Teachers Colleges at Albany, Brockport, New Paltz, and Oneonta, New York. Of the 400 original respondents 254 were secondary trainees from the first two colleges and 146 were elementary trainees from the last three colleges named. There were 140 beginning teachers who responded to the second part of the study as well as having responded to the first part.

Two questionnaires of 60 questions each were used, with the identical question content in each except for the opening phrase: in the first case, "Do you expect that . . ." and in the second case, "Did you find that . . .". The questions referred to conditions which prospective teachers might expect in teaching: ability to meet needs of slow pupils, helpful supervision, good teaching aids, freedom from community pressures, satisfactory salaries, and similar items.

At the time of the second questionnaire, the

respondents were encouraged to indicate also their opinions of their administrators, their fellow teachers, their communities, and their colleges with respect to their helpfulness to them as beginning teachers.

The data from the first questionnaire indicated that the 60 suggested preconceptions were accepted by the respondents, but with varying degrees of acceptance. Three responses to each questions were possible: YES if accepted as stated, NO if the expectation was that the condition would be opposite to the statement, and NO IDEA if not accepted.

The respondents accepted most positively those preconceptions which dealt with their readiness to face the problems of the classroom and those dealing with their personal educational philosophy.

They gave the strongest NO response to a miscellaneous group of questions such as: freedom from school work on weekday evenings, finding objective parents, freedom from community prejudice, having interested pupils, and automatic promotion.

The greatest NO IDEA response was reported for those questions which related to their relationships with their principals and fellow teachers.

They were not optimistic concerning their working conditions or community relationships.

The responses were analyzed in certain groupings: the elementary trainees were more likely to state YES than the secondary trainees; those who knew where they were to teach the following year were more definite in their preconceptions than those without appointments.

With respect to the Part II questionnaire the general tendency was that conditions and experiences were more satisfactory than had been expected.

The administrator was the key figure in these responses from the beginning teachers. Of the total favorable and unfavorable comments 45% and 48% respectively were directed to the administrators.

The beginning teachers were most disillusioned as to the questions relating to community participation in the school. Their better-than-expected reaction was strongest in the questions relating to teacher-pupil relationships, the freedom of the teacher in professional matters, and freedom from community pressures.

This study poses certain questions concerning the responsibilities of teacher education institutions, administrators, and communities for the preparation of prospective teachers for the actual conditions of teaching. 173 pages. \$2.16. MicA54-1536

# THE CONSTRUCTION AND VALIDATION OF A PROFESSIONAL BELIEFS INVENTORY FOR PROSPECTIVE TEACHERS

(Publication No. 8154)

Ernest Warde Kelly, Ed. D.  
Indiana University, 1953

## Problem

The purpose of this study was to construct and validate a professional beliefs inventory for prospective teachers. The major problems involved in this investigation were: 1) to develop a method of procedure; 2) to construct the professional beliefs inventory; 3) to test the validity and reliability of the inventory; 4) to devise a method of scoring the inventory; and 5) to check its discriminating power among different classes of prospective teachers.

## Procedure

Since little research has been done concerning beliefs and because of the close relationship between beliefs and attitudes, the procedure used in this study resulted largely from a detailed investigation of the various techniques which have been used in the study and measurement of attitudes. The different techniques selected for use in this study were as follows:

1. The investigator, by means of reading, discussions, and lectures, made a comprehensive survey of the entire field of education.
2. Careful consideration was given to the major concepts in the field of education and these concepts were grouped into eight major areas.
3. The criteria which are developed for the construction of belief and attitude statements were patterned largely from those criteria used in the construction of attitude statements. A total of 675 belief and attitude statements were constructed.
4. The grammatical ambiguity was checked in each of the statements by three English experts from the English Department at Indiana University.
5. The first approximation of validity was checked by having five educational specialists evaluate each of the statements in terms of: 1) the extent to which each of the statements should be included in the inventory; 2) needed rewording and classification of each statement; 3) statements which were omitted which should have been included in the inventory.
6. The maturity level of the statements were checked by having 42 junior class students respond to the inventory.
7. The second approximation of validity was accomplished by having 13 educational experts establish the correct answers for each of the statements and check the professional ambiguity within each of the statements.
8. The inventory was given to 106 freshmen and 40 senior class students for the purposes of: 1) establishing the reliability of the inventory; 2) checking



the discriminating power of the inventory; 3) testing a method of scoring the inventory.

#### Conclusions

This study was concerned only with the initial stages of the final validation and refinement of the professional beliefs inventory. Recognizing the limitations involved the investigator emphasizes that the conclusions of the study are valid only within the framework of the limitations.

The conclusions are as follows:

1. It is possible to use statements of beliefs and statements of attitudes in the same inventory without causing confusion or frustration upon the part of college students in education.
2. The four scores devised for scoring the inventory could possibly be significant in identifying personality differences such as a student's tendency to be cautious, to make crude errors, and to be dogmatic or uncritical in his beliefs.
3. Statements where the responses of the seniors were opposed to those of the judges may constitute educational concepts which need considerable more attention devoted to them in the pre-service education of these students.
4. The method scoring the inventory needs to be revised so that a student may receive some accuracy score credit upon a statement in which his responses agree with only a minority of the judges.
5. Seniors, at their stage of development, appear to be more dogmatic or more positive in their responses than individuals who have considerably more professional maturity.
6. The coefficient of reliability, which was .9224, is considered to be relatively high for this type of instrument.
7. The senior class students were significantly more accurate in their responses to the statements of the inventory than were the freshmen.

293 pages. \$3.66. MicA54-1537

#### RELATIONSHIPS BETWEEN INTERESTS AND STUDENT TEACHING ACHIEVEMENT

(Publication No. 8155)

George Paul Robb, Ed. D.  
Indiana University, 1953

#### THE PROBLEM

The purpose of this study was to determine the relationships between Kuder Preference Record scores and student teaching achievement scores. It was felt that the investigation might provide data which would be useful to those who counsel prospective teachers.

#### METHODS AND PROCEDURES

The findings of the study were based on data obtained from 328 Indiana University students who participated in practice teaching in public schools in the State of Indiana. The students represented a

purposive sample taken from a population of 377 student teachers who taught in several subject-matter areas. Each student performed his student teaching at the junior or senior high school level during the 1950-51 and 1951-52 school-years and was rated on his teaching performance by a critic teacher.

Kuder Preference Record scores, ACE Psychological Examination scores, credit-point ratios and scores from a student teaching rating sheet were used to represent interests, intelligence, four-year scholastic achievement and teaching achievement, respectively.

The 328 students in the study were divided into groups on the basis of subject-matter taught and sex when such divisions were feasible. This procedure led to the formation of 20 groups of students.

Pearson zero-order correlations were computed between teaching achievement scores and the Kuder Preference Record scores in order to determine the relationships between practice teaching achievement and expressed interests. Because there was a possibility that intelligence and four-year scholastic achievement might affect the interest-teaching achievement relationships, second-order partial correlations were computed. This necessitated finding the zero-order coefficients between four-year scholastic achievement scores and interest scores, between four-year scholastic achievement scores and intelligence scores, between intelligence scores and interest scores, between teaching achievement scores and intelligence scores, and between teaching achievement scores and four-year scholastic achievement scores, since these correlations were needed in the second-order partial correlation formula. The t-test was applied to all the correlations which were computed in order to determine their significance at the 5% and 1% levels of confidence.

#### FINDINGS

The significant correlations which were computed between four-year scholastic achievement scores and scores on the interest scales ranged from .647 to -.527. However, very few were found to be high enough to indicate definite relationships between the Kuder scale scores and college grades.

Of the 20 groups studied, only two showed highly significant correlations between intelligence scores and college grades. These groups were the men and the women who taught physical education.

A few significant correlations were found between intelligence scores and scores on the Kuder scales, but none was above  $\pm .480$ .

Only two of the 20 correlations between teaching achievement and intelligence were found to be significant, the highest being .437 for the men who taught commercial studies. The correlations for the other groups were generally positive, but low.

All the correlations between teaching achievement scores and four-year scholastic achievement scores were found to be positive except one. Six of the 19 positive correlations were found to be significant and they ranged from .191 to .680.

A few significant correlations were found between teaching achievement scores and interest scores. The significant correlations were found to be both positive and negative, but very few exceeded  $\pm .50$ . The second-order partial correlations differed very little from the zero-order correlations, indicating that intelligence and four-year scholastic achievement did not appreciably affect the teaching achievement-interest relationships.

On the basis of the results of the study, the following conclusions were reached:

1. In general, there was very little relationship between the four-year scholastic achievement and expressed interests of the students in the study.
2. There was a slight positive relationship between intelligence and the four-year scholastic achievement of the students.
3. Very little relationship, if any, existed between intelligence and the expressed interests of the students.
4. In general, practice teaching achievement was positively, but slightly, related to the college grades and intelligence of the students.
5. There appeared to be slight relationships between certain expressed interests and the practice teaching achievement of the students.
6. Kuder Preference Record scores cannot be used to predict success in student teaching.

116 pages. \$1.45. MicA54-1538

## EDUCATION, THEORY AND PRACTICE

### PRE-FRESHMAN MATHEMATICS IN STATE COLLEGES AND UNIVERSITIES

(Publication No. 7971)

Louise S. Hunter, Ed. D.  
University of Virginia, 1953

It was the purpose of this study to ascertain the status of pre-freshman mathematics in state colleges and universities. The term "pre-freshman mathematics" was for this study defined as high school or college mathematics offered in college, the study of which would enable a student to remove whatever his college interpreted as a deficiency in mathematical preparation for the courses he wished to pursue. Answers were sought to the following questions about courses in pre-freshman mathematics:

- (1) How extensively are such courses offered?
- (2) On what bases are students selected and assigned to classes for the removal of deficiency in mathematics?
- (3) What type of credit is given for pre-freshman courses in mathematics?
- (4) What is the content of these courses?
- (5) What is the instructional personnel for these courses?
- (6) What textual materials are used in pre-freshman mathematics courses?

- (7) How do instructors rate their results?
- (8) What is the approximate percentage of students who pass pre-freshman mathematics courses? What percentage of these who pass pre-freshman mathematics enter college mathematics courses? What success do these students have in college mathematics courses?
- (9) Approximately how many students enroll in these courses in pre-freshman mathematics?
- (10) What general impressions do instructors have of their experiences in offering these courses?

Data for this study were obtained from the following sources:

Responses to a questionnaire from 269 colleges and universities in the 48 states and territories.

The mathematical offering of 369 colleges and universities.

103 text-books and syllabi used in mathematics courses in 269 colleges and universities.

1. 74 per cent of the 269 colleges and universities responding to the questionnaire offer pre-freshman mathematics courses. Among six classes of institutions pre-freshman mathematics courses are offered with the following frequencies: sixteen of 22 technical colleges offer courses in the pre-freshman mathematics, twenty-two of 27 state universities, fifty-two of 61 land grant colleges and universities, fifty of 73 teachers colleges and colleges of education, forty-eight of 73 liberal arts colleges, and twelve of 13 junior colleges.

2. Placement tests and admission units were the most widely used bases for the selection and assignment of students to such classes. Fifty-eight per cent of the institutions use each of these bases alone or along with other bases. Poor class performance was used alone or along with other bases in 31 per cent of the colleges and universities.

3. Fifty-eight per cent of the colleges and universities indicated that they offer some pre-freshman mathematics courses for college credit. Some of these same institutions also offer other pre-freshman mathematics courses which give no college credit.

4. Forty-three per cent of the colleges and universities give non-credit pre-freshman mathematics courses. Some of these same institutions also offer certain pre-freshman mathematics courses for college credit.

5. Sixteen per cent of the institutions offer pre-freshman mathematics courses for entrance credit.

6. Seventy-eight per cent of the colleges and universities reported that algebra is included in their pre-freshman mathematics offerings; forty-one per cent include plane geometry; sixteen per cent include solid geometry; twelve per cent include basic or general mathematics; and six per cent include trigonometry.

7. Pre-freshman mathematics courses are taught entirely or in part by the regular mathematics



staffs in 93 per cent of the colleges and universities. Land grant colleges and universities tend to use student assistants for this teaching more frequently (42%) than other classes of colleges.

8. Fifty per cent of the institutions use algebra text books for courses in pre-freshman mathematics; thirty-seven per cent use plane and/or solid geometry texts; thirty-one per cent use general or basic mathematics text books; seven per cent use arithmetic books; and six per cent use trigonometry texts.

9. Eleven per cent of the institutions rated the results of their experience in offering pre-freshman mathematics as "Excellent"; thirty-eight per cent gave a rating "Good"; thirty-five per cent gave a rating "Average"; five per cent gave ratings of "Poor"; and fourteen per cent gave no rating.

10. 132 institutions reported estimates of the per cent of their students taking pre-freshman mathematics who passed the courses. An average of these estimates was 75 per cent. Similarly, an average of the reported estimates of per cent of students passing pre-freshman mathematics who continued in college mathematics courses was 65 per cent. Likewise an average of the estimates of the per cent of the students continuing college courses in mathematics who passed such courses was 67 per cent.

11. Enrollments in pre-freshman mathematics courses amounted to: 132 students per technical college, 400 students per state university, 400 students per land grant college, 90 students per teachers college, 170 students per liberal arts college, and 65 students per junior college.

This study seems to justify such conclusions as the following:

The problems of pre-freshman mathematics are the serious concern of mathematics instructors throughout this country.

The offering of pre-freshman mathematics courses is widespread especially in the state colleges and universities.

It seems reasonable to predict that the number of institutions offering pre-freshman mathematics will increase rather than decrease.

There is a wide diversity of practice in (a) assignment of credit for pre-freshman mathematics courses and (b) the use of text books for such courses.

Among those who express highest satisfaction with results in offering pre-freshman mathematics are instructors who have written their own texts for such courses and those who report years of experience and research in giving pre-freshman mathematics courses.

The values of pre-freshman courses are suggested by the large number of institutions which express satisfaction with their results in giving such courses and by the percentage of students who

pass college mathematics courses after taking pre-freshman mathematics courses.

264 pages. \$3.30. MicA54-1539

## INDUSTRIAL ARTS IN CATHOLIC EDUCATION

(Publication No. 8235)

Marvin Francis Poyzer, Ed. D.

Bradley University, 1954

The purpose of this study is to provide and interpret information concerning the place and the relationships of the industrial arts in Catholic education. It is an attempt to provide a semantic reorientation of basic industrial arts formulations and practices for educators, especially Catholic educators.

The interpretation of industrial arts in Catholic education is discussed under such headings as (1) the map called education; (2) the map called industrial arts; (3) some reasons Catholic schools do not have more industrial arts; (4) the values of industrial arts; (5) methods of education and industrial arts; (6) levels of industrial arts; (7) content of Catholic industrial arts; (8) some types of industrial arts laboratories; (9) planning the industrial arts shop; (10) some dangers and low points of industrial arts; (11) industrial arts and vocational education; (12) industrial arts and life adjustment.

The study suggests a rather new formulation for the definition of the industrial arts as an educational medium. It suggests that the "transformation of the student thru the student transforming materials" is the dominant theme and not "the study of industry."

To supplement and supply information about beliefs and practices of Catholic educators regarding the industrial arts a survey was taken and the results reported under such headings as (1) Catholic viewpoints of industrial arts; (2) conflicts of industrial arts with accepted Catholic policies; (3) industrial arts and vocational education; (4) Catholic "history of craftsmanship in materials" and its loss in modern Catholic education; (5) some reasons for not having industrial arts in the Catholic schools; (6) future planning concerning industrial arts; (7) clubs that have crafts as a working basis; (8) books or articles helpful to Catholic educators; (9) information and materials desired by Catholic educators; (10) values of industrial arts as seen by Catholic educators; (11) opinions of Catholic educators as to what industrial arts will do for schools; (12) opinions of Catholic educators regarding skills and building knowledge; (13) courses of industrial arts offered by Catholic schools reporting; (14) instructor status as reported by schools having industrial arts; (15) opinions of Catholic educators on sending students to public schools for industrial arts experiences; (16) topics of a proposed study on industrial arts considered important by Catholic educators; (17) beneficial results to students because of inaugurating industrial arts; (18) reactions of Catholic educators to offering industrial arts to girls; (19) areas of industrial arts which seem to have promise for girls according to

Catholic educators; (2) suggestions and remarks regarding the inquiry; (21) summary of the inquiry.

Generally, the inquiry provided information desired, such as (1) there seem to be no basic conflicts between the industrial arts and Catholic policy; (2) values, as interpreted by Catholic educators, are not the main obstacles to the provision of more industrial arts; (3) industrial arts and vocational trade training are as confusing to the Catholic educator as they are to educators everywhere; (4) most Catholic educators would welcome information about the various phases of planning and justifying the industrial

arts; (5) most Catholic educators would welcome some type of building experience in their training; (6) most educators would approach with caution the practice of sending Catholic students to public schools for industrial arts experiences; (7) a complete survey of industrial arts in Catholic schools would bring much advance and progress to light; (8) a growing number of Catholic educators are becoming acquainted with the industrial arts and are capable of positive statements regarding them.

178 pages. \$2.23. MicA54-1540

## ENGINEERING

## ENGINEERING, GENERAL

## LIMITING FLOW RATES IN A SPRAY LIQUID-LIQUID EXTRACTION COLUMN

(Publication No. 7580)

Wang-Mo Wong, Ph.D.

State University of Iowa, 1954

This investigation presents the results of the studies of limiting flow rates in the 2-inch and the 0.65-inch I. D. spray columns with the systems mineral oil-water, toluene-water with and without acetic acid, diethylamine and morpholine, and mineral oil and toluene-water with either acetic acid or diethylamine. Specifically, the aim was (1) to determine the effect of mass transfer and adhesion tension and the "wetting property" of the system on the limiting flow rates, and (2) to develop a general correlation of flooding rates with the physical properties of the system and column.

When mass transfer was taking place, flooding rates were slightly higher but holdup was slightly lower at and below flooding point. These effects were greater in the 2-inch column than in the 0.65-inch column. The plot of log dispersed phase rate against continuous phase rate at the flooding point results in a straight line. From this plot the equation representing the flooding rates is derived as follows:

$$\log(V'_{df}/A) = -BV_{cf}$$

A and B are constants and equal to  $\bar{C} R^M$  and  $C' R^{M'}$  respectively, where

$$\bar{C} = 0.042(\rho_d^{1.4}/\sigma_i^{0.25} \mu_d^{0.51} \Delta\rho^{1.52}),$$

$$M = 1.62(\sigma_i^{0.16} \mu_d^{0.32} \Delta\rho^{0.98}/\rho_d^{0.48}),$$

$$C' = 0.0001435x(\rho_d^{0.24}/\mu_c^{0.8} \sigma_i^{0.6} \mu_d^{0.45} \Delta\rho^{2.4}),$$

$$-M' = 0.57 \log(0.12/\mu_c^{0.8} \rho_d^{0.76} \sigma_i^{0.6} \mu_d^{0.53} \Delta\rho^{2.4})$$

The dispersed drops of toluene and toluene containing morpholine had a tendency to adhere to the

walls of the column, but those of the toluene containing either acetic acid or diethylamine did not. This is accounted for by the fact that the adhesion tensions of the first two liquids are high and those of the last two are low. The adhesion tension of water containing acetic acid is lower than that of water. However, the toluene drops did not adhere to the walls when acetic acid was used as continuous phase but did adhere to the walls when water was used as continuous phase. This is due to the fact that the acetic acid changes the wetting property of water. Mineral oil and toluene containing either acetic acid or diethylamine did not adhere to the walls, except that the extraction of acetic acid was from toluene to water.

Adhesion of drops of organic solvent to the walls of the 0.65-inch column causes local flooding and ultimate failure of the column operation. In the 2-inch column, this effect may change the flooding point.

The coalescence test showed that drops of toluene containing acetic acid coalesced easily, whereas drops of mineral oil and toluene containing diethylamine did not. The drops of other organic solvents was between these extremities. In the extraction runs, the toluene containing acetic acid dispersed into comparatively large drops. The dispersed drops coalesced when the extraction was from toluene to water.

The plot of holdup against dispersed phase rate at flooding results in a straight line when the dispersion is upward. The slope of this straight line represents the rejection velocity. Under identical conditions, the holdup in the 0.65-inch column was lower than that in the 2-inch column. In the 2-inch column and at flooding point, increased dispersed phase rate gave greater holdup, but in the 0.65-inch column this effect was reversed.

The holdup data which are measured by the pressure-drop and the volume displacement method can be made to agree within 5%.

156 pages. \$1.95. MicA54-1541



## ENGINEERING, AERONAUTICAL

COMPUTING THE LINE OF POSITION  
IN CELESTIAL NAVIGATION

(Publication No. 8233)

Luther Eugene Finley, Ed. D.  
Bradley University, 1954

It was the purpose of this study to investigate the most nontechnical methods of solving the astronomical triangle, to investigate the mathematical methods of solving the astronomical triangle, and to devise a method as simplified as possible to locate the line of position with a minimum of equipment and on as nontechnical a basis as possible. The attempt to establish a better method for celestial navigation is covered by chapters devoted to (1) the problem, (2) a review of the literature, (3) a proposed new method, (4) latitude and longitude, (5) time, (6) celestial positions, (7) the line of position, (8) the use of "Table A", and (9) the use of "Table B".

The new method is summarized as follows. The latitude of the substellar point for celestial bodies is given in the *Air Almanac*, and the longitude can be determined from the *Almanac*. The navigator has determined his great circle distance from the substellar point by his sextant observation. The scale of the charts makes it impractical to construct a circle of equal altitude. The navigator uses his tables to determine different locations on the circle of equal altitude. By constructing a line through these established locations he has constructed a segment of the line of position for his locality.

In constructing the segment, the navigator first selects parallels of latitude on the meridian through the substellar position. He computes the angular distance between the circle of equal altitude and the meridian through the substellar position on a great circle perpendicular to the meridian through the substellar position at the selected parallels of latitude. This may be done by the proper use of "Table A". The logarithmic cosine function of the difference in latitude of the substellar position to the great circle perpendicular to the meridian, through the substellar position, is subtracted from the logarithmic cosine function of the observed distance of the zenith to the selected body as measured by the sextant. The remainder is the logarithmic cosine function of the distance on the great circle, perpendicular to the meridian through the substellar position at the selected latitude, between the circle of equal altitude and the meridian through the substellar position. The navigator finds the terrestrial coordinate point on his charts for the intersection of the circle of equal altitude with the great circle perpendicular to the meridian through the substellar position at the chosen latitude. This may be done by the proper use of "Table B".

"Table B" gives the latitude and longitudinal difference of the end of an arc on a great circle, for each minute of degree of angular distance of arc, when the great circle is perpendicular to any meridian of longitude with its vertex at any latitude.

191 pages. \$2.39. MicA54-1542

## ENGINEERING, CHEMICAL

THE HYDROGENATION OF CARBON DIOXIDE  
ON A NICKEL CATALYST

(Publication No. 8294)

John Norman Dew, Ph. D.  
University of Michigan, 1953

The purpose of this investigation was to determine the effects of partial pressures of the reactants and temperature on the initial reaction rates between hydrogen and carbon dioxide on a reduced nickel catalyst at elevated pressures.

The initial reaction rates were derived from low conversions obtained in a differential flow reactor. Space velocities were in the order of 300,000 1/hr. The catalyst bed was supported in a 2 ft. by 3/4 in. schedule 40 steel pipe. Temperature control was provided by pressurized boiling liquids which were contained in a steel reactor jacket. Infra-red spectrophotometric analysis was used for methane and carbon monoxide. Orsat analysis was used for carbon dioxide.

A range of reaction conditions of 540°F to 750°F, 2 atm. to 30 atm., and 6% to 90% carbon dioxide feed mixtures were investigated. Carbon deposition was negligible in this range of reaction conditions.

Methane was formed by the reaction,  $\text{CO}_2 + 4\text{H}_2 \rightarrow \text{CH}_4 + 2\text{H}_2\text{O}$ . The initial reaction rates ranged from 0.015 to 0.40 lb. mols/hour-lb. catalyst.

Carbon monoxide was formed by the reaction,  $\text{CO}_2 + \text{H}_2 \rightarrow \text{CO} + \text{H}_2\text{O}$ . The initial reaction rates ranged from less than 0.005 to 0.10 lb. mols/hour-lb. catalyst.

The initial rate of methane formation can be correlated over the entire pressure range by the equation,

$$r_o = \frac{k P_{\text{CO}_2} P_{\text{H}_2}^4}{(1 + K_1 P_{\text{H}_2} + K_2 P_{\text{CO}_2})^5}$$

The initial rate of methane formation at 2 atmospheres can be correlated more closely by the equation,

$$r_o = \frac{k P_{\text{CO}_2}^{1/2} P_{\text{H}_2}^2}{(1 + K_1 P_{\text{H}_2})^3}$$

The initial rate of carbon monoxide formation can be correlated by the equation,

$$r_o = \frac{k P_{\text{CO}_2}^{1/2} P_{\text{H}_2}}{(1 + K_1 P_{\text{H}_2} + K_2 P_{\text{CO}_2})^2}$$

The constants in the preceding equations were evaluated over the range of reaction conditions investigated. 157 pages. \$1.96. MicA54-1543

# THE ELECTROWINNING OF TITANIUM AND ZIRCONIUM

(Publication No. 8254)

Arthur Joseph Kerbeczek, Jr., Ph. D.  
Columbia University, 1951

A detailed literature survey on electrodeposition from non-aqueous baths is presented. Besides covering the field of Ti and Zr electrodeposition, we searched the literature for low temperature (0 - 200° C) electrolytic baths from which the following metals could be deposited: Li, Na, K; Be, Mg, Ca, Ba, Sr; Al; La, Ce, Th, U; V, Nb, Ta; Mo, W; Ge. These metals, like Ti and Zr, are difficult to electrodeposit from aqueous solution. Of all the baths covered only one appeared capable of direct conversion to Ti or Zr electrowinning. This was the KBr-AlBr<sub>3</sub> bath of Kameyama.<sup>1</sup>

We extended the range of Kameyama's work on Al deposition and went on to determine that TiBr<sub>4</sub> is soluble in conducting melts of KBr and AlBr<sub>3</sub>. From these KBr-(or KBr and LiBr)-AlBr<sub>3</sub>-TiBr<sub>4</sub> baths we were able to deposit Ti-Al alloys which varied in atomic ratio from 0.13 (18 wt. % Ti) to 3.4 (86 wt. % Ti). The total current efficiency varied from 3 to 40 percent. We employed current densities from 0.2 to 50 amps/dm<sup>2</sup>. The mole percentage of TiBr<sub>4</sub> in these baths varied from 0.5 to 5.0 mole %.

We investigated fused bromide eutectics containing the following metals: Li, Na, K, Ca, Sr, and Ba. None had a lower freezing point than the LiBr-KBr binary eutectic (mpt. 348°C). We also investigated bromoaluminate (48 mole percent AlBr<sub>3</sub>) eutectics based on the same six metals. We were able to obtain a 15° C depression below the freezing point of the LiAlBr-KAlBr<sub>4</sub> binary eutectic (140°C).

We added many different polar halides to TiCl<sub>4</sub> (at 100° C), and to TiBr<sub>4</sub> (at 180° C). None of these additions caused any increase in conductivity.

We tested the solubility of ZrCl<sub>4</sub>, K<sub>2</sub>TiF<sub>6</sub> and K<sub>2</sub>ZrF<sub>6</sub> in LiCl-KCl in the temperature range of 352-380°C, and LiF-KF-NaF<sup>2</sup> in the temperature range of 454-480°C. We found appreciable solubility (at least one mole percent) in all cases.

There are no double salts of TiCl<sub>4</sub> reported in the literature. We found that such a double salt is precipitated when a vapor stream of TiCl<sub>4</sub> is bubbled into the following three melts at 400-450°C: LiCl-KCl-NaCl, LiCl-KCl-CaCl<sub>2</sub>, and LiCl-KCl-MgCl<sub>2</sub>. TiCl<sub>4</sub> is soluble in MgCl<sub>2</sub>-NaCl-KCl but no double salt precipitates. We believe that the double salt is a lithium compound.

Deposition was performed from the melts mentioned in the previous paragraph while a vapor stream of TiCl<sub>4</sub> and argon was being continuously introduced. Titanium metal (98%) was deposited from the LiCl-KCl-NaCl and LiCl-KCl-CaCl<sub>2</sub> melts at all the current densities used (1.6 - 32.0 amps/dm<sup>2</sup> and 8.0 - 32.0 amps/dm<sup>2</sup> respectively). The current efficiency varied from 2 - 54% for the NaCl melt, and from 42 - 62% for the CaCl<sub>2</sub> melt.

The titanium deposit from the LiCl-KCl-MgCl<sub>2</sub>

melt contained no more than 0.3% Mg at current densities up to 16 amps/dm<sup>2</sup>. At 24 and 32 amps/dm<sup>2</sup>, the Mg percentages were 1.2% and 4.0% respectively. In the current density range of 38 - 104 amps/dm<sup>2</sup> the percentage Mg remained fairly constant (8 - 10%). The total current efficiency varied from 52% at 8 amps/dm<sup>2</sup> to 22% at 104 amps/dm<sup>2</sup>.

The titanium deposit from the MgCl<sub>2</sub>-NaCl-KCl melt contained 1.3% Mg at 8 amps/dm<sup>2</sup> and 43.8% Mg at 32 amps/dm<sup>2</sup>. The total current efficiency varied from 44.6% at 8 amps/dm<sup>2</sup> to 25% at 32 amps/dm<sup>2</sup>.

All the Ti or Ti-Mg deposits were spongy or powdery.

Double salt formation between ZrCl<sub>4</sub> and NaCl is mentioned in the literature.<sup>3</sup> We were able to precipitate a ZrCl<sub>4</sub> double salt upon introducing (at 430°C) an argon-ZrCl<sub>4</sub> vapor stream into the same LiCl-KCl-CaCl<sub>2</sub> melt that we used in connection with Ti deposition. Deposition from this bath yielded Zr metal (98%). The current efficiency varied from 2.3% at 12 amps/dm<sup>2</sup> to 60% at 32 amps/dm<sup>2</sup>. The deposits were spongy.

183 pages. \$2.29. MicA54-1544

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2. Bergman, A. C., and Dergunov, E. P., Compt. Rend. Acad. Sci. U.S.S.R. 31, 753-4 (1941). C.A. 37-823 (1943).

3. Belozerskii, H.A., and Kucherenko, O. A., J. Applied Chem. (U.S.S.R.) 13, 1552-5 (July 1940). C.A. 35-3877 (1941).

## PROMOTION OF SOME CHEMICAL REACTIONS WITH GAMMA RADIATION

(Publication No. 8331)

John Galen Lewis, Ph.D.  
University of Michigan, 1954

The purpose of the program of investigation described below was to study some radiation-promoted chemical reactions of potential industrial importance.

Many chemical systems of interest are gaseous, and a pressure reactor was constructed to study such systems in the presence of radiation. A description is given of the design, construction, and successful operation of this pressure reactor used in proximity to the sources of radiation.

Most irradiations were performed using hollow cylindrical sources of gamma radiation in which cobalt-60 was the active material. Dose rates were evaluated chemically, physically, and mathematically, and by providing a measure of the intensity of irradiation, made possible the relating of irradiations and the chemical effects observed. Maximum dose rates of about 250,000 rep in air per hour were observed at the center of the larger source and of about 60,000 rep in air per hour, at the center of the smaller source.

Ethylene irradiated with cobalt-60 gamma radiation and subjected to doses of 0.5 to 7 megarep at



pressures of 250 psig to 2000 psig and at room temperature yielded a white, solid polyethylene. No influence of pressure or of chemical additives could be observed upon the radiation yield of this reaction, which varied from a G value of about unity at 0.5 megarep to about 2000 at about 3 megarep and higher doses. The molecular weight estimated from melt viscosity increased to about 40,000 at 7 megarep. Crystallinity decreased from about 75 per cent at 2 megarep to about 71 per cent at 7 megarep. Stress-strain plots of tensile specimens resembled those of brittle materials, and the ultimate tensile stresses increased with dose to about 2400 psi at 7 megarep. The melting-point-range increased from about 200-220° F. up to 250-700° F. as the dose increased from 0.5 to 7 megarep.

Some investigations other than the work with ethylene resulted as follows: irradiations were with cobalt-60 gamma radiation unless noted. An approximately stoichiometric mixture of nitrogen and hydrogen yielded no measurable ammonia when irradiated by one curie of palladium-109 for 12 hours at 1000 psig and 70° F. Raw linseed oil, boiled linseed oil, de-gummed soya oil, castor oil, refined menhaden oil, and cottonseed pitch irradiated at one atmosphere absolute and room temperature over a period of 9 days by 120 to 2 curies of palladium-109 formed films, except for the castor oil and the cottonseed pitch, and gained weight more rapidly than did the control samples. The exceptions were the cottonseed pitch, which did not change weight, and the boiled linseed oil, in which the control gained more weight than did the test sample. Mixtures of sulfur dioxide and oxygen were irradiated at 40,000 to 100,000 rep at one atmosphere absolute and room temperature in aqueous solution; at 80,000 rep at 50 psia and 240° F.; and at 120,000 rep at 800 psig and 500° F. Irradiation did not accelerate the oxidation of sulfur dioxide measurably. Kerosene and chlorine subjected to 2,000,000 rep at one atmosphere absolute and room temperature reacted to the same degree as unirradiated control samples. Chlorine reacted rapidly with benzene at one atmosphere absolute and at 14 to 68° F., producing hexachlorocyclohexane containing 12 to 13 per cent gamma isomer, about the same as the material produced by ultra violet light. Carbon dioxide and hydrogen, mixed in approximately 2 to 1 molar ratio and subjected to about 1,500,000 rep at 1100 psig and room temperature, did not react. Soya oil subjected to about 2,000,000 rep at one atmosphere absolute and room temperature and subsequently heated for 6 hours to 575-600° F. at one millimeter absolute was slightly more viscous than unirradiated oil. Acetylene subjected to 1,900,000 rep at 20 psia in the presence of acetone and at room temperature yielded a small amount of an unidentified solid insoluble in acetone. Isobutylene subjected to 3,000,000 rep at room temperature and at its vapor pressure yielded about one per cent of the initial charge as a thick oil. Propylene subjected to about 2,000,000 rep at room temperature and at its vapor pressure yielded a small amount of unidentified volatile liquid.

141 pages. \$1.76. MicA54-1545

## ENGINEERING, CIVIL

### THE DYNAMIC ANALYSIS OF TALL STRUCTURES IN THE ELASTIC AND INELASTIC RANGES

(Publication No. 8152)

Leo Schenker, Ph. D.  
University of Michigan, 1954

The investigation of the dynamic behavior of structures can be divided into four phases:

- (i) estimate of the forces that a structure may be called upon to withstand;
- (ii) determination of the structural characteristics, including those of the foundation, that govern the dynamic responses of the structure. These characteristics are functions of stiffness, damping coefficients and of the distribution of mass;
- (iii) development of procedures to permit the computation of deflections and stresses from the information in (i) and (ii);
- (iv) simplification of the procedures developed under (iii) to make them suitable for design office use.

This study is concerned with phase (iii), the development of analytical procedures.

The orthodox method of analyzing the responses of a multi-degree-of-freedom system to a time-varying system of forces is described. This involves the determination of the natural frequencies and mode shapes and the "uncoupling" of the simultaneous differential equations associated with forced vibrations, by the use of Lagrange's equations. A numerical example, involving a three-story building with infinitely rigid girders, is worked out.

Next, it is shown how the above procedure can be modified to make it applicable to buildings with flexible girders, permitting rotation of the joints. This leads to the fact that a certain static property of a structure, the stiffness matrix, together with the mass distribution, is all the information required for a dynamic analysis, as far as the structure is concerned. The especial utility of moment-distribution for the computation of the stiffness matrix is pointed out. Once this static stiffness matrix has been determined for the structure, taking account of any desired refinements such as the effect of semi-rigid connections, rocking at the foundation, lengthening and shortening of the columns, the dynamic analysis can be carried out without referring back to the physical properties of the structure. Numerical examples are worked out for a three-story building and a chimney represented by a cantilever supporting a number of concentrated masses.

The extension of the procedure to the condition when parts of the structure are stressed beyond the yield point is described. Yielding reduces the numerical values of all frequencies and when yield has taken place to an extent that uncontrolled deformation ensues, the fundamental frequency is shown to be zero. The numerical example of the three-story building is continued.

The procedure for taking account of viscous damping in a multi-degree-of-freedom system is described. Given the (viscous) damping in each mode, a method for calculating the coefficients of time rate of change of all displacements is developed. These coefficients must be known if the original equations of motion are to be solved with the analog computer.

The solution of all numerical examples is confirmed by the use of the differential analog computer. A special circuit to take care of elastic-plastic deformations is described.

The conclusion is reached that a basis has been established for the work of phase (iv) – the development of simplified design procedures whose accuracy can therefore be compared with that of more rigorous methods discussed in this work.

105 pages. \$1.31. MicA54-1546

## ENGINEERING, HYDRAULIC

### SIMULTANEOUS FLOWS OF AIR AND WATER IN A CLOSED FLUME

(Publication No. 5489)

Temel Halil Orga, Ph. D.  
State University of Iowa, 1953

Chairman: Professor John S. McNown

This investigation was a study of the phenomenon of simultaneous flows of air and water in a closed laboratory flume of rectangular cross-section. Included were two special cases of the simultaneous flows of air and water: (1) the fluids flowing in the same direction, and (2) in opposite directions. Among the main objectives were an evaluation of the mutual interaction of surface waves and surface drag, and the dependence of these on parameters or characteristics of the flows and of the fluids.

The study was suggested and partially financed by The Engineering Foundation and the Iowa Institute of Hydraulic Research. Laboratory tests were started in May 1944 and completed in January 1945. A brief historical review concerning the present stage of knowledge about the phenomenon of simultaneous flows of air and water was made as a preliminary step in this investigation and is included.

From the analysis of the results of experiments it was concluded that both the drag and the corresponding drag-coefficient at the interface of the two fluids depend upon the combined effects of the water flow, the velocity gradients of both air and water flows at the interface, a parameter indicating the relative roughness of the surface of flowing water, the pressure gradient of the air flow, and the surface tension between air and water. The results can be summarized as follows:

- a) The drag moving air exerts on the surface of flowing water is proportional to the square of

the relative velocity of the air, and to a roughness coefficient for the water surface.

- b) The minimum drag necessary to generate and maintain capillary waves on the surface of flowing water seems to be constant and equal to about  $320 \times 10^{-5}$  lb/ft<sup>2</sup>.
- c) At a relative air velocity of about 22 fps, capillary waves were observed on the surface of water flowing at depths above critical.
- d) On the surface of water flowing normally at depths below critical no capillary waves of any form could be observed before the generation of gravity waves.
- e) For air flowing with water, regular capillary waves were observed at relative air velocities of about 26 fps for water depths near the critical and if initial surface disturbances were small.
- f) For all conditions, gravity waves were observed once the limiting air velocities were exceeded. For air moving with the water, these waves grew in size in the direction of air flow. For air flowing against water flow, these gravity waves moved with the water unless the relative air velocity exceeded 35 fps. Then they were transformed into very long waves which moved in the direction of the air flow.
- g) On the surface of water flowing at depths below critical, gravity waves were formed and moved downstream at relative air velocities between 22 and 40 fps.

Additional tests were conducted to study the special case of flow of air over a still-water surface so as to determine the effect of the initial depth upon the wave elements, the behavior of these waves as they meet a sloping barrier, the damping effect of an oil film, the nature of bottom currents set up by surface waves, and the effect of air-generated waves on gravel breakwaters. The results of these additional tests are summarized as follows:

- a) Capillary or surface-tension waves, generated against the action of surface tension, continue so long as the generating air velocity of 8.2 fps is maintained.
- b) The critical slope of the barrier at which the oncoming waves begin to reflect was about 20 degrees.
- c) The oil film spread on the still water surface does not have any damping effect on displacement waves. For wind-generated waves, the oil film damps completely all the waves below the stage of breaking, damps slightly waves below the breaking stage, and is ineffective after the waves start to break.
- d) A bottom current moving against the direction of wave advance exists if the surface of water is subjected to wave action.
- e) The minimum stable weight of stones on a given slope of the windward face of a mound breakwater depends upon the slope, the wave characteristics, the ratio of initial water depth to wave length, and to the densities of



both stone and water; the minimum theoretical values obtained from the Iribarren formula were found to be quite low; and the coefficient K in the Iribarren formula changed with the wave characteristics and increased with decreasing values of the ratio of normal water depth to wave length.

168 pages. \$2.10. MicA54-1547

## ENGINEERING, MECHANICAL

### DESIGN OF FOUR-LINK MECHANISMS

(Publication No. 8252)

Ferdinand Freudenstein, Ph. D.  
Columbia University, 1954

The dissertation consists of an analytical investigation of linkage analysis and synthesis and an investigation of machine methods of linkage synthesis.

#### Linkage analysis

A general study has been made of means of description of the motion of four-link mechanisms. The symmetry inherent in four-link mechanisms has been used in developing an analysis, the simplicity of which is comparable to that of the well known graphical methods.

A general analytical expression has been derived relating the diagonals of a four-bar linkage by means of a characteristic, symmetric parameter. The nature of this expression has been analyzed using operational mathematics especially developed for the purpose. The particular case obtained by using as a parameter the square root of the sum of the squares of the lengths of the links diminished by the sum of the squares of the diagonals has been found significant. The analysis of four-link mechanisms using this parameter, has been worked out in detail and the results reduced to a form believed to be useful in design work. The geometrical significance of this parameter leads to concise formulae which are easy to derive, check, and remember. Their application is often easier than that using conventional methods of analysis. Actual and potential design applications have been considered. The former include, amongst others, the analysis of mechanisms previously considered too complex for analysis, the verification of graphically obtained results, and the derivation of numerical results to any desired degree of accuracy.

#### Linkage synthesis

An analytical treatment has been developed for the design of computing linkages. The analysis has been restricted to a single four-bar linkage designed to generate an arbitrary function approximately over a finite range. A number of methods of varying degrees of accuracy and complexity have been developed, enabling a designer to select the one best suited to his particular requirements. In general, the values of two, three, or four of the seven parameters which characterize a computing linkage are chosen arbitrarily and the values of the

remaining parameters determined analytically according to the type of synthesis which is required. In special cases, no assumptions need be made regarding the values of any of the parameters. The computations are arranged in simple, tabular form and can be carried out in a routine manner using desk calculators or automatic devices such as, for instance, involving punched card machines. The synthesis is accurate and systematic and in many cases faster and simpler than that using equivalent graphical techniques, where they exist.

An analogue computer performing multiplication, and based on this theory, has been built and shown to function satisfactorily.

#### Machine methods of linkage synthesis

An experimental approach to linkage synthesis has been proposed. Several systems for machine synthesis of four-link mechanisms have been considered. One of these solves by analogy, the equations of a previously developed analysis. A second type is based on physical principles not related to previous analyses and is not limited to linkage mechanisms which can also be synthesized by analytical or graphical means. It is thought that in the case of organizations extensively engaged in work requiring linkage synthesis, the construction of machines to perform such work can prove time saving and useful, especially in those cases where no other means of arriving at a design are known to exist.

275 pages. \$3.44. MicA54-1548

## ENGINEERING MECHANICS

### ON NON-SYMMETRICAL PROBLEMS OF HEMISPHERICAL SHELLS

(Publication No. 8272)

James Gilbert Berry, Ph. D.  
University of Michigan, 1954

The purpose of this investigation, is to use the stress function approach to obtain expressions for the stresses and displacements which arise when a thin, elastic, hemispherical shell is subjected to non-symmetrical loads. These expressions are then used to obtain numerical values of the stresses in the special cases of: (1) a concentrated load at the apex, the shell being supported at two points; and (2) two concentrated edge moments.

The general equations of thin, spherical shells, in the sense of Love's first approximation, are reduced to a system of two, fourth order, partial differential equations which contain the stress function and the radial displacement as dependent variables. The homogeneous solutions of these equations, valid for the hemisphere, are obtained in terms of Legendre functions of both real and complex indices. The particular solutions of these equations, in the case of an arbitrary, radial load, are obtained by expanding the load in a Laplace series and then using the method of undetermined coefficients.

In the case of a concentrated load, the particular solutions converge too slowly to be of practical use; therefore it is necessary to develop an approximate solution of the first example. In order to establish its validity, the approximate solution is used to obtain the stresses in a shell which is clamped at the edge and carries a concentrated load at the apex. These stresses are then compared with available experimental data as well as the predictions of the shallow shell theory due to E. Reissner. While the agreement with experiment is only fair, the agreement with shallow shell theory is excellent. On the strength of these comparisons, it is concluded that the approximate solution is sufficiently accurate to warrant its use.

96 pages. \$1.20. MicA54-1549

#### A STUDY OF HEAT TRANSFER AS RELATED TO A SPECIAL CASE OF SECONDARY MOTION

(Publication No. 8286)

Lyle Gerald Clark, Ph. D.  
University of Michigan, 1954

The purpose of this investigation is to study the effects of secondary motion upon heat transfer characteristics of a fluid. The secondary motion is the special type formed by a fluid in the annulus of two concentric rotating cylinders. The annulus thickness is small compared to the other critical dimensions of the system. When the inner cylinder is rotated above a certain critical speed, the fluid flow in the annulus becomes unstable and forms a secondary or eddy type motion. A study is made of the heat transferred through these eddies when a temperature gradient exists across the annulus.

Part I is an analytical treatment of the stability equations as set forth by G. I. Taylor in his work on secondary motion of this type. Special assumptions are made extending the use of Taylor's equations. As a result, it is shown that the cores of the secondary eddies tend to move away from the axis of rotation of the cylinders.

Part II presents a method of solution to the heat transferred through the secondary eddies. A numerical method is completely formulated by which solutions may be obtained with the use of a large digital computer.

Part III is an experimental study of the heat transferred through an eddy. The angular momentum of the eddies was determined by the use of motion pictures. The angular momentum was then compared to the heat transfer coefficient as determined by experiment. It was found that a linear relationship exists between the angular momentum of an eddy and its corresponding heat transfer coefficient. At the same time, it was found that the angular momentum is also linearly related to the Reynolds Number at speeds of the inner cylinder above critical.

As a final result, it is assumed that turbulence consists of a statistical distribution of eddies. It is then concluded that the heat transfer through the

turbulent fluid region around a body, moving relative to the fluid, is a linear function of the Reynolds Number. These assumptions make it possible to correlate heat transfer data, for several cases, in what is believed to be an improved manner. The resulting equations represent the facts very well.

122 pages. \$1.53. MicA54-1550

#### THE PROPAGATION OF STRESS PULSES IN CYLINDRICAL BARS

(Publication No. 8319)

George Kellogg Hess, Jr., Ph. D.  
University of Michigan, 1954

An investigation is made of the propagation of stress pulses produced by the collision of cylindrical metal bars. The characteristics of the stress pulses as influenced by the collision speed, material properties, and bar geometry are studied.

At the instant of collision a very large compressive disturbance is initiated in the bar. Due to material rigidity effects in the pressure-density relations, the compressive disturbance separates into an elastic pulse followed by a plastic pulse at low impact speeds in slender rods or followed by a shock pulse at high impact speeds in large bars. For intermediate conditions with respect to bar diameter and impact speed, the effects of plastic deformation, lateral inertia, and compressibility must be considered.

The differential equations of axially symmetric plastic deformation are compared with the simple one-dimensional theory of pulse propagation and are modified to include the effects of lateral inertia. A numerical example is given showing a method of including the effects of plastic deformation, lateral inertia, and compressibility.

It is shown that in bars with sufficient lateral inertial confinement an elastic wave is followed by a strong compressive shock pulse. A transition zone follows the shock front in which a plastic deformation occurs that relieves the high stress condition behind the shock front.

It is concluded that

- 1) Lateral inertia and compressibility effects are both important in the high speed collision of metal bars.
- 2) A transition zone in which the plastic deformation occurs follows the shock pulse. Its thickness is proportional to bar diameter.
- 3) The analytical and numerical methods presented agree with known test results.

133 pages. \$1.66. MicA54-1551



## ENGINEERING, METALLURGY

FACTORS OF HOT WORKING WHICH INFLUENCE  
THE HIGH-TEMPERATURE STRENGTH OF  
A SOLUTION-STRENGTHENED,  
HEAT-RESISTANT ALLOY

(Publication No. 8299)

John Frederick Ewing, Ph. D.  
University of Michigan, 1953

An investigation was carried out to study the mechanism by which hot working influences the high-temperature properties of a solution-strengthened, heat-resistant alloy. The study included both the as-worked condition and the influence of hot working on the response to heat treatment.

Experimental variables were temperature and amount of deformation by rolling. Rupture and creep tests, hardness measurements, microstructural examinations, and lattice parameter measurements were made to obtain fundamental data to study the influence of hot working on strengths at elevated temperatures.

Both very high and very low high-temperature properties for the alloy resulted from varying the conditions of hot working. Two opposing components of the deformation process apparently acted simultaneously during hot working: a strengthening component due to strain hardening and a weakening component due apparently to over straining. Increasing the working temperature and/or amount of reduction increased the weakening component during rolling. The weakening from over straining, however, was transitory since it was removed by suitable heat treatment after rolling. It was, therefore, designated as quasi-damage.

At temperatures of working where recrystallization occurred quasi-damage was apparently caused by recrystallization. In the absence of recrystallization quasi-damage was possibly related to some form of recovery, the breaking up of stable

sub-structures, or the formation of actual sub-microscopic defects.

Increasing the strain rate during testing and/or decreasing the testing temperature minimized the influence of quasi-damage. Indications are that any decrease in strength due to recovery during testing was less than the decrease resulting from quasi-damage.

By restricting reductions at any one temperature during working over a falling temperature range to those causing little quasi-damage, high strengths were obtained despite large total reductions.

The inability to directly correlate high-temperature properties in the hot-worked condition with hardness is due to the fact that the amount of quasi-damage necessary to weaken the high-temperature strength is not reflected in the hardness. Consequently, it was possible to obtain first an increase and then a decrease in strength by varying the amount of deformation during rolling even though the resultant hardness levels continually increased.

The use of lattice parameters to determine the amount of odd sized atoms in solution in the matrix was complicated by the fact the lattice parameter of this alloy was appreciably influenced by the cooling rate from elevated temperatures.

This alloy is subject to a precipitation reaction in the matrix at temperatures between 2000° and 1800° F. The amount of precipitation which occurred in one-half hour at these temperatures had no significant effect on rupture strength, but did decrease creep resistance.

It is concluded from this investigation that hot-working conditions can appreciably influence the high-temperature strength of this type of alloy. However, by keeping the reheating temperatures high during working, and thereby continually removing the damage effects from prior working, it would be possible to consistently obtain high strengths at elevated temperatures by controlling the finishing operations of the hot-working process.

152 pages. \$1.90. MicA54-1552

## GEOGRAPHY

THE GEOGRAPHY OF MANUFACTURING  
INDUSTRIES IN NORWAY

(Publication No. 8178)

Jerome Percival Pickard, Ph. D.  
Syracuse University, 1954

Advisor: Robert B. Dickinson

Manufacturing industries occupy an important place in the Norwegian economy. In 1950, they employed one-fifth of the labor force and accounted for 35 percent of gross national product. The small plant is most typical: the median worker was found

in a plant employing 65 workers; the median establishment had only three workers. Norway's industries exhibit maturity (illustrated by the number and variety of products made) and vitality (demonstrated by their rapid growth despite low protective tariff rates).

Five major industry groups have been defined by their relationship to raw material sources and markets, as follows:

- DI Domestic-Market Industries, based chiefly upon Imported Raw Materials
- DD Domestic-Market Industries, based chiefly upon Domestic Raw Materials

- DX Domestic-Market Industries, based upon both Imported and Domestic Raw Materials  
 ED Export-Market Industries, based upon Domestic Raw Materials  
 EP Export-Market Industries, based chiefly upon Low-Cost Electric Power

About four-fifths of Norwegian manufacturing serves the domestic market. This sector of industry is largely market-oriented in its locational pattern, though some branches are an exception. Certain industries have a labor orientation, and others have a considerable orientation to old direct power sites.

Export-market industries strongly favor location on the seaboard, in order to utilize cheap water transportation for movement of both materials and products. Electricity networks now transfer power from inland hydroelectric sites to the coast; this has further stimulated tidewater location.

Table 1 shows the geographic distribution of population and of manufacturing employment in Norway:

TABLE 1. LAND AREA, POPULATION, AND MANUFACTURING EMPLOYMENT IN NORWAY, BY MAJOR REGIONS AND MAJOR INDUSTRY GROUPS, 1950

(All Data in Thousands)

Major Region	Land Area	Population	Employment by Industry Group					Total
			DI	DD	DX	ED	EP	
Oslo	0.17	433.3	30.2	17.6	16.3	0.6	0.4	65.2
Other Eastern Norway	34.35	1148.9	34.0	28.6	21.8	19.7	6.7	110.8
South Norway	6.0	172.7	3.6	4.3	2.1	1.7	2.0	13.8
Western Norway	21.8	811.2	19.8	18.2	21.5	10.8	6.9	77.3
Trondelag	15.1	307.6	4.6	6.3	2.8	3.0	0.9	17.6
North Norway	41.8	403.6	1.8	3.5	0.7	1.9	0.4	8.3
NORWAY	119.2	3277.2	94.1	78.7	65.2	37.7	17.3	293.0

In Eastern Norway, manufacturing is concentrated in the Southeastern Norway manufacturing region (150,000 employed) which extends from the Swedish border through Oslo to Telemark, including numerous towns on the Oslofjord. Six other manufacturing regions have been defined (employment data in parentheses), as follows: Bergen (25,800), Stavanger (16,300), Mjøsa (11,300), Trondheim (10,500), Sunnmøre (9,800), and Kristiansand (5,700). These seven regions contain 78 percent of all manufacturing employment in Norway. The remaining employment is scattered, with more than half localized in sixty-eight outlying manufacturing areas which have from 100 to 2,500 employees each.

Manufacturing has concentrated in areas having a relatively dense population, coastal location, active commercial development (which has supplied capital), and access to power resources. At the present time (1954), the greatest relative expansion is under way in the electrometallurgical industries, which utilize little manpower. No great increase in the proportion of manufacturing employment to the total labor force is expected in the near future. The overall geographic distribution pattern of domestic-market industries is likely to remain essentially unchanged, but the expansion of the power-consuming industries is occurring mainly in Western and North Norway.

405 pages. \$5.06. MicA54-1553

## GEOLOGY

### THE GEOLOGY AND ORE DEPOSITS OF THE SANTA MARÍA DEL ORO GOLD-COPPER DISTRICT, DURANGO, MEXICO

(Publication No. 8291)

Robert Irving Davis, Ph. D.  
 University of Michigan, 1954

The discovery of gold and copper deposits near Santa Maria del Oro in northern Durango, Mexico, probably dates to the late 16th Century. Incomplete production records show that the district has produced more than 325,000 ounces of gold and 18,000,000 pounds of copper. The ore bodies occur along a series of prominent northwest-striking fissures that cut the fine-grained Magistral granite. The major veins of the district have been developed over a strike length of nearly 3 kilometers, and to a depth of about 250 meters.

The mineralization represents the last episode of an extended orogenic period beginning with crustal instability and intrusion, probably of Laramide age, and culminating with mineral deposition during the early Tertiary. The granite stock was intruded at a relatively high crustal level and arched the cover of Paleozoic phyllites and quartzites. Northeast-southwest compression, followed by a shift of the axis of compression to a north-south direction, produced five sets of fractures along which both felsite porphyry and slightly younger diabase dikes were intruded. Slightly later fractures, which developed along similar trends, served as channels for the ore solutions.

Subsequent block faulting and associated uplift led to exposure and erosion of the mineralized stock. The exposed surface was quickly buried by an extensive cover of limestone conglomerate derived from



continued erosion of the nearby Sierra del Oso range to the northeast. Deposition of the conglomerate was followed closely by extrusion of thick rhyolitic flows with which were associated tuffs and breccias. The conglomerate-rhyolite series is considered to range in age from late Miocene to middle Pliocene.

During the initial stage of the two-phase hypogene mineralization, abundant quartz and pyrite, with lesser amounts of sericite and arsenopyrite, filled the fissures; the wall rock was converted to a cryptocrystalline quartz-sericite intergrowth. After deposition of the earliest vein material, a reopening of the veins and the formation of some new fissures permitted a renewed flow of the ore solutions. During this stage hematite, pyrrhotite, chlorite, and carbonate were first deposited in both the veins and wall rock; sulfides and sulfo-salts of copper, lead, and zinc, as well as abundant carbonate, were next precipitated. One of the last minerals deposited was native gold.

The two phases of mineralization are thought to stem from the same source. Their contrasting mineralogy probably reflects variations in the physiochemical environment through which the solutions passed, rather than a fundamental difference in composition at their source. Deposition of specular hematite, pyrrhotite, and chlorite at the beginning of the second stage of mineralization is believed to represent the period of highest temperature. Reopening of the veins and consequent release of pressure between the two phases of mineralization probably freed carbon dioxide, which combined with calcium, magnesium, and iron to form ankerite, dolomite, and calcite in the walls and veins. The abundant specular hematite as a second-stage mineral perhaps resulted from oxidizing effects of carbon dioxide with an accompanying low concentration of the sulfide ion. Precipitation of most of the copper, lead, and zinc minerals and the native gold probably resulted from cooling of the solutions.

291 pages. \$3.64. MicA54-1554

#### GEOLOGY OF THE WILLBOB LAKE AREA, NORTHERN QUEBEC AND WESTERN LABRADOR

(Publication No. 8306)

Murray James Frarey, Ph.D.  
University of Michigan, 1954

The Willbob Lake area lies in the Labrador-Quebec boundary area, approximately 225 miles south of Ungava Bay. The area is in the northeastern part of the belt of Proterozoic rocks known as the Labrador Trough, approximately 50 miles northeast of the iron ore developments in the Knob Lake district. The Willbob Lake area is part of a strip of dominantly basic igneous rocks roughly 30 miles wide and of unknown length, trending northwest.

The field study was carried out during the mapping program of the Geological Survey of Canada.

The sedimentary and volcanic rocks of the Willbob Lake area are divided into four groups, all

thought to be of Huronian age. The two lower divisions, the Knob Lake group and the overlying Howse group, are composed dominantly of fine-grained clastic and chemical sediments; the writer suggests that these groups belong to one sedimentary sequence and may be considered as a single division. In the Willbob Lake area, these sediments dip moderately to steeply northeast and form long narrow strips and lenses separated by large conformable bodies of gabbro. The two upper groups are separated from the lower groups by an unconformity and a prominent fault, which follow the Walsh Lake-Lac Faute lineament. These younger divisions are composed chiefly of basic volcanic rocks; the Murdock group consists chiefly of schistose pyroclastic rocks, whereas the younger Doublet group comprises pillowed and massive flows intruded by numerous meta-gabbro sills and underlain by an interbedded assemblage of greywacke, argillite and quartzite. The rocks of the Murdock and Doublet groups were probably deposited in a Proterozoic eugeosyncline.

Remarkably conformable ultrabasic sills up to at least 25 miles long intrude the Doublet group; gabbroic layers overlying the sills are thought to be differentiated from the same intrusions. A marginal tremolitic zone and two interior altered peridotite zones characterize the ultrabasic sills; serpentinization was deuteric and most intense in the innermost zone. Among the gabbros intruding the Howse rocks is a porphyritic variety given the field term "leopard rock". Cream-coloured aggregates of altered plagioclase up to six inches in diameter make this a distinctive rock.

Conspicuous folds appear only in the Doublet group, in which long gentle flexures trend and plunge southeastward; z-shaped buckles on the limbs of large folds resemble large drag folds, and it is suggested that a north-south shear couple acted during the deformation. The Howse group is apparently monoclinical, but may contain more complex folds. Flexures in the foliated Murdock rocks cannot be defined.

The Walsh Lake-Lac Faute fault is a major break extending far beyond the limits of the Willbob Lake area. Together with most of the fractures, it is a strike fault along which reverse movement occurred. Later minor faulting along tension fractures occurred. The deformation took place in late Proterozoic time. Subsequent minor disturbances are inferred from general evidence in the region.

Scattered sulphide deposits contain mainly pyrite and pyrrhotite, with local occurrences of chalcopyrite, sphalerite and galena. The sulphides of copper, zinc and lead followed the iron sulphides in a later stage of mineralization. The sulphides commonly replace argillite beds of the Howse and Doublet groups. Mineralization is generally sparse, and no ore bodies of economic value have been discovered to date.

The area probably lies near the effective centre of the Labrador ice sheet. Movement occurred in several directions, but an early northwestward movement and a later flow toward the northeast are

dominant. Both glacial erosion and deposition were slight. Glaciation had little influence on the development of lakes or other topographic forms.

166 pages. \$2.08. MicA54-1555

# THE GRENVILLE GEOLOGY OF SOUTHEASTERN ONTARIO

(Publication No. 8180)

Bennett Lawrence Smith, Ph. D.  
Syracuse University, 1954

An area of some 450 square miles in southeastern Ontario has been mapped by the writer and assistants during three field seasons for the Ontario Department of Mines. Preliminary reports of this work have been published and a more detailed report is in process of publication. The results of additional field and laboratory studies, outside the scope of the Department of Mines publication, provide the basis for this paper.

Most of the Grenville geologic maps of the last four decades in Ontario have subdivided the rock types into the following units: metavolcanics crystalline limestones, paragneiss and other metasediments, granitic rocks and basic intrusives. A "Hastings series", younger than the rest of the Precambrian metasediments, has been identified on some maps. In the present work an attempt was made to map objectively the lithology which is shown on a lithologic map. A second map, representing the writer's interpretation of stratigraphy, was then prepared and is also presented.

Highly metamorphosed basic volcanics have been identified as such by remnant pillows and relict agglomerate structures. In one location there is some evidence that the volcanics are underlain by a boulder granite conglomerate. Two broad belts of crystalline limestone with interbedded paragneiss and schist occur in the area mapped. The crystalline limestones have been subdivided into several lithologic units based on such factors as association with quartzite interbeds, physical appearance and a degree of metamorphism.

The non-calcareous sediments are represented by two main types, feldspathic quartz biotite paragneiss and hornblende-plagioclase schist and gneiss.

Migmatite occurs locally, bordering a large mass of granite gneiss.

Quartzose conglomerate and quartzite closely similar to that described elsewhere as belonging to a Hastings series occurs in Palmerston township with varved rocks consisting of carbonate minerals or metamorphic derivatives plus biotite and some quartz overlying the conglomerate.

Two chief types of granite gneiss are described, a grey, sodic plagioclase-biotite type, and a pink, more potassic, leucogranite gneiss. One large mass and some smaller bodies of diorite and gabbro occur in the area studied.

A younger granite together with some syenite definitely intrudes the diorite and gabbro. Tentatively, and as a basis for further study, the stratigraphic sequence is interpreted to be as follows: basic volcanics and agglomerates, followed in turn by crystalline limestone and dolomite together with interbedded paragneiss and schist, conglomerate and quartzite, varved argillite, crystalline limestone, metagreywacke, mafic schist which is at least partly of volcanic origin, and possibly a younger crystalline limestone. These were folded and metamorphosed with penecontemporaneous emplacement of granite gneiss. Intrusion of diorite and gabbro followed and younger granite and syenite completed the Precambrian sequence. Critical in the above interpretation is the assumption of a strike fault crossing the entire map area, designated the Fernleigh-Clyde fault. The chief evidence for the existence of such a fault is a great contrast in degree of metamorphism and a contrast in regional structure in part of the map area on either side of a zone of intense shearing.

As for the regional picture of southeastern Ontario, the principal conclusions are: (1) that it may become possible to identify the Arnprior-Claire River limestone belt as younger than the main mass of the Grenville, (2) that the interpretation of two ages of volcanics in the present map area may offer a means of reconciling various points of view as to the age of metavolcanics in other mapped areas and (3) the obvious fact that only with detailed mapping of much more of southeastern Ontario will it become possible to write with confidence on the historical geology of the Grenville.

205 pages. \$2.55. MicA54-1556



## HEALTH SCIENCES

### HEALTH SCIENCES, PUBLIC HEALTH

#### INTERACTION IN VITRO BETWEEN POLIOMYELITIS VIRUS AND NERVOUS TISSUE

(Publication No. 8285)

Liang-Wei Chu, Ph. D.  
University of Michigan, 1954

The purpose of this study was to determine whether specific combination between poliomyelitis virus and nervous tissue of susceptible host could be demonstrated in vitro. The experiments were made mainly by mixing homogenized brain tissue with a suspension of poliomyelitis virus (Lansing strain) and determining the amount of virus removed from the fluid by the tissue.

It has been consistently observed that addition of monkey brain tissue to a suspension of Lansing virus results in marked reduction in the virus titer of the fluid. It can be shown that the virus is adsorbed to the tissue by direct inoculation of the sediment into mice. The adsorptive affinity for the Lansing virus is associated mainly with the grey rather than the white matter. Non-nervous tissues likewise have much less affinity for the virus when tested in a

similar manner. Brain tissues of animal species other than man and monkey show distinctly less adsorptive capacity for the poliomyelitis virus under similar experimental conditions.

The Lansing virus was shown to be selectively removed from the suspension by primate brain tissue, leaving the other protein material in the fluid practically unaffected. The specific nature of the adsorption is further supported by the finding that the tissue factor combining with the poliomyelitis virus is apparently different from the factors responsible for combination with the influenza virus and tetanus toxin.

Judging from its reaction to heat, alkalies and proteolytic enzymes, it is concluded that protein is probably an essential constituent of the factor which combines with the poliomyelitis virus. The results obtained from tissue fractionation studies indicate that the virus-combining property is chiefly associated with the cytoplasmic components of the neuron.

The marked in vitro affinity of primate nervous tissue for the poliomyelitis virus suggests its possible relationship to species and tissue susceptibility in poliomyelitis.

59 pages. \$1.00. MicA54-1557

## HISTORY

### HISTORY, ANCIENT

#### THE OFFICIALS OF KARANIS (27 B.C.-337 A.D.): A CONTRIBUTION TO THE STUDY OF LOCAL GOVERNMENT IN EGYPT UNDER ROMAN RULE

(Publication No. 8327)

Margaret Elizabeth Larson, Ph. D.  
University of Michigan, 1954

This dissertation attempts to describe the functions of the officials in the government of the village of Karanis in the Fayum area of Egypt from the time of Augustus down through the reign of Constantine. The most important aspect of this period of Egypt's history was that Rome drained the country of its resources in both money and grain, by a taxation system that demanded so much from the native population that the economy of the country declined rapidly and steadily during the whole period. Not only were the natives forced to pay high taxes, but they had to serve as tax collectors and then as other public officials as well, without salary, while incurring great

expense and inconvenience to themselves. Moreover native tax collectors were held responsible personally for amounts that they could not collect. These abuses led frequently to the flight of persons from their native villages and the abandonment of property and crops. This view of Egypt's history is already well known, but it is further borne out by this dissertation. The offices that the natives were required to fill were called liturgies, and these are the offices with which this thesis deals on the village level.

The information concerning this period in Egypt's history comes largely from papyrus documents that have been preserved from Egypt. Many have been published, and these have served as source material for this study.

The officials whose functions have been described are: the village secretary, the village elders, the komarchs, the census officials, the police, the keepers of the granaries, the tax collectors, the boundary officials, and the guards of the canals and other public property. An appendix lists the persons who held these offices, by name as well as chronologically under the title of each office.

133 pages. \$1.66. MicA54-1558

## HISTORY, MODERN

THE ADMINISTRATIONS OF LORIS-MELIKOV  
AND IGNATIEV, 1880-1882

(Publication No. 8315)

Hans Heilbronner, Ph. D.  
University of Michigan, 1954

Much has been written of the revolutionary movement of the 'eighties in Russia, but little attention has been paid to the efforts of the Russian government to destroy that movement by the introduction of timely reforms. This study has been undertaken in order to examine the responses of the Tsars and of the responsible ministers during the years of greatest tension, 1880-1882. For the greater part of that period Loris-Melikov was charged with the primary duty, first as Chief of the Supreme Commission, then as a very powerful Minister of the Interior, of combatting the terrorist organizations.

The main object has been to analyze the parts played by Alexander II, by the Cesarevich, the later Alexander III, by Loris-Melikov, and by other ministers in creating a new state structure which would at once maintain the autocracy and introduce certain representative features in the Russian government. Loris-Melikov's administration is studied from the points of view of the constitutional nature of his representative scheme, his liberalization of censorship, the control of education, police measures, and the reactions of important individuals and groups to these new policies. The second aim of this work has been to chart the development of the ideas of the Cesarevich, later Tsar Alexander III. The influence of Pobedonostsev in this evolution of thought, the second marriage of Alexander II, and the assassination of the latter have been the focal points of interest in this investigation. Finally, the program of Loris-Melikov's successor, Count Ignatiev, is examined.

The results of these researches throw much new light on the actual nature of this period of relaxation of repression and on the main personalities involved. Alexander II is found, in the last years of his life, to be less and less concerned with a full participation in government, a task left up to Loris-Melikov who had been invested with extraordinary powers. The latter's program of action aimed first at a pacification of the nation on the basis of police measures against the revolutionary movement. To prevent new outbreaks, he promulgated measures of reform which were to be the logical continuation of the interrupted Great Reforms. No part of his suggestions partook of a constitutional nature. In all his endeavors, he enjoyed the full, often enthusiastic support of the Cesarevich. It was only some time after the assassination of Alexander II that his son slowly moved away from support, to neutrality, and finally to hostility to Loris-Melikov's project. The influence of Pobedonostsev became decisive only after the fact of the assassination had established a fertile ground for his gifts of persuasion. The new period of reaction did not commence fully with the

departure of Loris-Melikov. His successor, Ignatiev, attempted for a year to carry on Loris-Melikov's program under the guise of a chastened Slavophile liberalism, culminating in his call for the convocation of a *zemskii sobor*. Only with his fall and the return to office of Count Tolstoy do we arrive at the final failure of attempts to propitiate a revolution from below by the application of reforms from above. The next time the question of a representative system was examined, it was done under the pressure of a revolution.

576 pages. \$7.20. MicA54-1559

A STUDY OF THE MACAULEY'S THEATRE  
IN LOUISVILLE, KENTUCKY, 1873-1880

(Publication No. 7565)

West Thompson Hill, Jr., Ph. D.  
State University of Iowa, 1954

Chairman: Professor E. C. Mabie

## Objective

This investigation of the Macauley's Theatre in Louisville, Kentucky, from 1873 to 1880, attempts to reveal the activity of one phase of that theatre's development, the resident stock company. The theatre began operations in 1873 under a resident method; this method became extinct at Macauley's in 1878. One season, 1879-1880, is included in this study in order to compare the new system of management and operation with the old. Little attempt has been made to include any stage history which was not in some way associated with Macauley's. The object is to relate the story of a local Mid-Western resident theatre during a significant transitional period in American stage history.

## Method

The method begins with the man who was responsible for the construction of this theatre, Bernard Macauley. It has been necessary to present some detailed information concerning Mr. Macauley's background in order to show why he chose Louisville for his new theatre location, where he received the funds with which to build, and what the people of Louisville thought about him and his new enterprise.

A great deal of emphasis has been given to the construction of the Macauley's Theatre since this description reveals not only the appearance of the theatre, both inside and out, but relates information concerning technical stage practice of the time. Also, the details of construction show many other relevant features such as dimensions, seating capacity, and type of architectures.

Background chapters one and two deal with the Macauley family and the construction of the theatre. Chapters three, four, five, and six describe the resident method of operation year by year from 1873 to 1879. These four chapters are concerned with the several different resident companies, the names of



the actors, their specialties, their backgrounds, and their life after leaving Macauley's; the method of operation, scenery, finances, rehearsals, and costumes; the plays, reviews, announcements, scheduling, and performances; the visiting stars, their plays, their support by the local company, and their local reviews.

Chapter seven explains the causes of the extinction of the resident method at Macauley's, explains the reason for the loss of the theatre by Bernard Macauley, and describes the theatre's activity under a new management and a new method of operation.

A summary of the entire study is found in chapter eight. An attempt is made here to show the general significance of the investigation by the pointing out of certain conclusions concerning the importance of the resident method in relation to the over-all theatrical picture in this country. Also in this chapter certain tabulations are listed giving statistical data concerning plays, playwrights, companies, and stars.

#### Findings

The Macauley Theatre, during the resident period, was operated in the same manner which had characterized the operation of resident stock theatres throughout this country during the previous half century. No word describes this worn out system better than the term "stock." The stock actors performed in "lines of business" just as the stock actors had done before them. The stock scenery at Macauley's saw service in every play from *Hamlet* to *East Lynne*, and the methods used in shifting it during a performance were as old as some of the plays it adorned. The stars and traveling companies brought the only new plays to Macauley's. As early as 1873 the resident companies at Macauley's were losing favor to the traveling companies, and by 1879 the traveling companies had taken over completely.

#### Conclusions

The resident companies served an important need in the early history of Western cities such as Louisville. It was the only method of operation possible before improvements in transportation developed in this country. It gave every community a theatre of its own – one which could produce the classic plays at a moment's notice.

489 pages. \$6.11. MicA54-1560

#### INDUSTRY THROUGH THE CRYSTAL PALACE: A STUDY OF THE GREAT EXHIBITION HELD IN LONDON, 1851

(Publication No. 7970)

Thomas Parke Hughes, Ph. D.  
University of Virginia, 1953

This study of the Great Exhibition of 1851 is not concerned so much with a description of the organization and the events of the Exhibition as with an

account and interpretation of the industrial exhibits on display and the reaction of contemporaries to these exhibits. Therefore, though primarily a study of the Exhibition, this dissertation is also an investigation of industry – especially British industry – as revealed at the first great world's fair.

The London Exhibition of 1851 initiated a series of great international fairs celebrating the mechanization of industry and the extensive utilization of natural power and resources. Held at mid-nineteenth century, the London Exhibition marked what is often thought of as a time of transition: the Early Victorian period gave way to the more tranquil and prosperous Mid-Victorian, and the Industrial Revolution with its disruptive and unconstrained influences entered a new phase characterized by the positive efforts on the part of society to give direction to hitherto rampant industrial growth.

Originally sponsored and organized by members of the Society of Arts, the Exhibition was taken by the members and their distinguished President, the Prince Consort, Albert, as an opportunity for Great Britain and the world to display the fruits of industry, to evaluate these, and to chart the course for the future.

The organizers had a concept of industry that was extremely broad, and the scope of the Exhibition was correspondingly inclusive. They prepared an elaborate scheme to classify the multifarious products resulting from assiduous human labor upon material substances. Raw materials, machinery, manufactures, and fine arts made up the major divisions and were broken down into numerous classes and sections. Coal, iron, and chemicals (for use in the textile industry) dominated the raw materials; steam engines and machine tools, the machinery; home furnishings, textiles, and hardware, the manufactures; and sculpture, the fine arts.

Among the manufactures could be found many examples of that taste – often maligned – called Victorian. Ornamented utilitarian objects and pure ornaments for furnishing and decorating the home characterized Victorian style. It was not an original style, but one borrowed here and there from the past – especially from the period of Louis XIV – and vulgarized by the substitution of machine production for individual genius and cheap, inappropriate materials for the more expensive and more suitable. Excessive ornamentation and the neglect of functional demands, though tolerated by the majority, were severely criticized by a small group of critics commenting upon the Exhibition who demanded of the manufacturer an aesthetic sense.

Not only was there a call for a closer relationship between industry and art, but also between industry and science. The literature of the Exhibition demonstrated the intense interest in rationalizing the many phases of English industry in the light of the methods and discoveries of science. Critics called for an increased emphasis upon industrial education and the removal of the barriers of conceit, jealousy, and contempt between the man of theory and the man of practice. Although their industry made the best showing at the Exhibition, Englishmen were prone to

self-criticism because of the challenge implicit in the imaginative and fashionable manufactures sent by France and the precocious ingenuity displayed by the United States.

While a number of persons called for extensive reforms in the techniques of industry, few persons writing about the Exhibition saw any need for radical changes in the relationship between industry and society or for an adjustment of the political and social structure. It was generally agreed that time and further mechanization would free individuals from physical drudgery, improve their living conditions, and therefore bring intellectual, moral, and spiritual progress. Not only individuals but society as a whole would prosper from industrial progress, according to commentators on the Exhibition. There was no fear of wars made terrible and a life regimented and made sterile through science and technology, but dreams of a world characterized by constructive competition between nations and individuals for material and spiritual perfection.

301 pages. \$3.76. MicA54-1561

#### THE CONVENTION ARMY, 1777-1783

(Publication No. 8326)

George W. Knepper, Ph.D.  
University of Michigan, 1954

The British army commanded by Lieutenant General Burgoyne, which surrendered to an American force at Saratoga, October 17, 1777, is commonly called the Convention army. The name is derived from the Convention of Saratoga, the treaty which ended the northern campaign. According to the Convention, Burgoyne's officers and men were to be embarked on British transports and taken to England on condition of not serving again in North America for the duration of the war. The rebels failed to comply with this provision and many of the royal captives lived in American prison barracks until 1783.

The purpose of this study is to tell the story of that confinement and of the negotiations between Britain and America for the prisoners' release. By delaying her fulfillment of the terms of Convention, America gained some initial advantages, but, in the long run, the problems of quartering, guarding, supplying, and exchanging the Convention troops became burdensome. The frustration built of many fruitless negotiations for exchange, led to deep mutual distrust between America and Great Britain.

Historians have tended to single out Congress as the sole culprit responsible for breaking the Saratoga Convention. Most of the limited literature about Burgoyne's army after Saratoga centers around this idea. This study attempts to demonstrate that such an interpretation is too limited and onesided. American and British documents, manuscript and printed, form the basis of this research: contemporary journals, letters, and memoirs have been freely consulted.

Several general conclusions can be drawn from the study. (1) The Americans distorted and broke the Convention of Saratoga. (2) Though Congress

was the principal offender, other Americans condoned its actions or acquiesced in its policies. (3) British military men in America broke minor provisions of the Convention, and failed to execute a coup which, if successful, would have constituted a major breach of faith. (4) Of the inhabitants of the areas around the prisoners' barracks, some profited from the money and trade brought by the captives while many suffered from the inflated prices, which likewise accompanied them. (5) In general, the Convention army received much better treatment than unconditional prisoners of war.

288 pages. \$3.60. MicA54-1562

#### ULTRA-CONSERVATIVE THOUGHT IN THE UNITED STATES IN THE 1920'S AND 1930'S

(Publication No. 8184)

George Smith May, Ph.D.  
University of Michigan, 1954

Although a considerable amount of scholarly work in recent years has dealt with moderate conservatives and so-called native Fascists in America, comparatively little effort has been made to differentiate systematically and analyze those conservatives who are more extreme in general character than the moderate conservatives but not quite as extreme as the reactionaries. It is with these individuals, who may be described as ultra-conservatives, that the present study is concerned.

Ultra-conservatives during the twenties and thirties were of three major types: the Fundamentalists whose extreme conservatism in religious matters carried over into other realms of thought as well; the patriotic, one-hundred-percent Americans prominent in groups like the Daughters of the American Revolution and the American Legion, whose major interest was in fighting all whom they considered threats to the safety of the nation; and the extreme economic conservatives found in organizations such as the American Liberty League and the National Association of Manufacturers, who were concerned chiefly with opposing social and economic reforms which might upset the status quo and their own position of dominance.

Ultra-conservatism never emerged as a clearly defined ideology. This was partly the result of the prevailing conditions in America which, by compelling American conservatives to lay aside traditional conservatism's emphasis on the virtues of an aristocratic, essentially non-democratic society composed of sharply differentiated classes, served to undermine conservative principles. Also, the dominance of business in American society caused conservatives to share with Americans in general a faith in such concepts as economic progress and individualism which were closer to traditional liberalism than to conservatism. In addition to these factors, ultra-conservatives were unable to take a clear and consistent philosophical stand because their emotional, doctrinaire attitude made them unable to recognize and to cope with flaws and contradictions



in their ideology, and at the same time their practical, materialistic and anti-intellectual attitude rendered them incapable of stating their philosophy in an entirely understandable fashion.

Intellectually, ultra-conservatism was, on the whole, recognizably conservative in character. The ultra-conservatives had little faith in the democratic view of man and society, believing instead that certain individuals were naturally superior to the mass of the people and that their superiority, as measured by such standards as economic success, should be rewarded by according to them a dominant role in society. Change was opposed because of a reverence for traditional ideas and institutions and a belief that certain basic laws and forces which were beyond the control of man governed society and thereby rendered the liberal's program of reform unrealistic and futile.

The ultra-conservative's emotional characteristics, however, tended to nullify the conservative nature of his philosophy. His fears of those whom he regarded as his opponents caused him to favor the use of repressive measures against these individuals, even though such tactics might endanger a traditional principle like law and order. The ultra-conservative's fears made him more dogmatic about his ideas and increased his desire to compel the acceptance of his views by all other persons. He lacked the moderate conservative's understanding of history and the nature of mankind which enabled the moderate to view radicalism and its proposals with relative calmness, trusting to time to bring conservatism the ultimate victory. Thus, the ultra-conservative was led one way by the philosophy which he espoused, while his emotions pulled him in the opposite direction. Ultra-conservatism, therefore, was a transitional ideology precariously balanced between conservatism and radicalism.

358 pages. \$4.48. MicA54-1563

THE ORIGINS OF THE C.I.O.: A STUDY OF  
CONFLICT WITHIN THE LABOR  
MOVEMENT, 1921-1938

(Publication No. 8230)

James Oliver Morris, Ph. D.  
University of Michigan, 1954

The "Civil War" which rocked the American labor movement and spawned the Congress of Industrial Organizations as a rival to the American Federation of Labor has commonly been recounted entirely against the background of the Great Depression and the New Deal. Moreover, the story has been told almost exclusively in terms of a difference of opinion with regard to the relative advantages of the craft and industrial-union methods for organizing the workers in the great mass-production industries. This approach is conspicuously manifest in the works of Herbert Harris, Edward Levinson, Benjamin Stolberg, and J. Raymond Walsh.

Actually, the insurgency which burst dramatically through the top level of labor leadership in

1933 was set afoot in, and nurtured throughout, the 1920's. Taking their cue from the workers' education movement, which they helped to found, a tiny group of sincere trade-union progressives, radicals, and socialists labored in the face of determined A.F. of L. opposition to effect an internal reform of the Federation. They were kin neither to the Communist "borers from within" who clustered about the Trade Union Educational League nor to the latter's successor, the dualist Trade Union Unity League which sought to destroy the A. F. of L. by external competition. The reformers were, above all, practical men and women with a long record of trade-union experience and an unquestioned allegiance to the Federation. To make their views manifest and to attract supporters, they founded the Workers' Education Bureau of America, the Labor Publication Society, the Conference for Progressive Labor Action, and Brookwood Labor College, the last of which rapidly became the rallying center for labor progressives. Although there is no organic link between the progressive labor organizations of the 1920's listed above and the Committee for Industrial Organization, which was set up in November, 1935, it must be noted that in many significant instances the participating individuals and unions were the same during both decades of the labor reform movement.

In addition to post-dating the movement which produced the labor split, labor historians have too narrowly conceived the nature and content of that movement. Although organizing the unorganized into industrial unions was at all times throughout the 1920's and 1930's the *sine qua non* of their program, the insurgents clashed with the A. F. of L. leadership with respect to other matters as well. In fact, labor progressives, have left a record of continuous, widespread revolt against the controlling leadership and policies of the A. F. of L. during the period 1921-1938. There was, for example, dissatisfaction with the Federation's non-partisan political policy, its anti-governmentalism and narrow, business approach to unionism, its opposition to strike militancy, its support of a watered-down type of workers' education, its seeming willingness to condone racketeering in certain affiliated unions, and its alignment with extremely conservative, non-labor organizations and individuals. In sum, the whole philosophy of "voluntarism" and "economism" developed by the Federation during earlier years was brought under attack.

The relationship of the events of the 1920's to those of the 1930's has probably been obscured by the intervening depression and the drama of the New Deal program, particularly Section 7 (a) of the National Industrial Recovery Act. However, although the depression and the New Deal did make possible a vastly different opposition to the Federation in terms of scope and ability to succeed than existed in the 1920's, the later insurgents, like their predecessors, fought primarily with words until 1935, and not before the summer of 1936 was there tangible proof that the ideological aspect of the movement would be superseded by organizing and other activities.

463 pages. \$5.79. MicA54-1564

THE TIME OF THE WHIRLWIND: A STUDY  
IN THE POLITICAL, SOCIAL AND ECONOMIC  
HISTORY OF CONNECTICUT FROM 1861 TO 1875

(Publication No. 8255)

William John Niven, Jr., Ph. D.  
Columbia University, 1954

"What I chiefly lament," wrote that inveterate New England traveller, Samuel Drake, as he mourned the passage of rural Connecticut, "is the disappearance of the Yankee - not the conventional Yankee of the theatre . . . but the hearty yet suspicious, 'cute', though green, drawling, whittling, unadulterated Yankee, with his broad humor, delirious patois and large hearted patriotism. His very mother tongue is forgotten . . . Railway and telegraph, factory and workshop, penetrating into the most secluded hamlet have rubbed off the crust of an originality so pronounced as to have become a type."<sup>1</sup>

The nostalgic Drake had been an observer of a social revolution in his own lifetime, a cataclysmic upheaval in manners, morals, and habits. Connecticut in 1860 had been a composite of the old and the new, with rather more of the old in her make-up; Connecticut of 1875 presented an aspect which was entirely different, a style which owed nothing to the classical and was outmoding the romantic design. Industry was the sorcerer as Drake had implied; industry had coruscated the simplicities of an earlier age, imparting complexity to the problem of living. By 1875, momentous advances in production and communication had practically erased the last vestiges of agrarian parochialism from the Connecticut mind.

Prosperity, materialism, unbridled speculation, and rampant individualism were the major economic and social values of the period. Hastened and emphasized by the war, they reached their highest point of social acceptance in the years between 1870 and 1873. Connecticut history was formed and directed by these forces; it was buoyant, extravagant, amoral and oftentimes brutal, yet for all its vitality it was basically insecure. There had never been such a display of wealth, such incredible building booms, ostentatious architecture, and material well-being. There had also never been such delinquency, drunkenness, and crime; and for every new mansion erected in Hartford or New Haven, there were ten working class families in dire need of bare shelter. The crumbling industrial slums with their drab, jerry-built shanties were as much a part of the Connecticut urban scene in the sixties and seventies as the proud mansard with its gardens, arbors, and lawns. The industrial revolution had brought great progress in material things, but it had uprooted old institutions, and it had not contributed new ones. It was still too youthful to have evolved an ethic which recognized that leadership also connotes responsibility. Furthermore, the industrialists seemed not aware that the economy had changed from the days of their youth and were still applying the old values in a society where they no longer had any meaning. Hence the chaotic amorality of the period, its frank belief that the only mediator was "the inexorable law of the machine."

The fourteen years that separated Drake's Connecticut of 1875 from the Connecticut whose citizens stood in the rain to read news bulletins about the bombardment of Fort Sumpter were years of great and lasting change. A rural society had largely disappeared in the epic making events of war and industrial revolution. As Gideon Welles observed, not without a touch of sadness, when he came home from Washington in 1869: "More than eight (years have passed) since I left and took up residence in Washington . . . Changes in that time have taken place. Hartford itself has greatly altered - I might say improved, for it has been beautified and adorned by many magnificent buildings, and the population has increased. . . A new and different people seem to move the streets. . . A new generation which knows not Joseph is here."<sup>2</sup> The old Connecticut had indeed passed on. New leaders had wrested the scepter of authority, and though uncertain of their responsibilities, waited impatiently for the confirmation of the future. 610 pages. \$7.63. MicA54-1565

1. S. A. Drake, *Nooks and Crannies of New England*, pp. 442, 443.

2. Gideon Welles, *Diary*, May 2, 1869.

THE LEGISLATIVE BASIS OF ARMY  
ORGANIZATION AND ADMINISTRATION  
IN FRANCE UNDER THE  
NATIONAL CONVENTION, 1792-1794

(Publication No. 7991)

Robert James Watson, Ph. D.  
University of Virginia, 1953

The first effects of the French Revolution on the military forces of France were disastrous. The disorganizing effects of the breakup of the old military machine, together with the hasty levying of volunteer troops who lacked proper training, largely nullified the excellence of the pre-Revolutionary standing army and the value of the superior morale of the volunteers. Consequently, when war broke out in 1792, France was almost defeated.

These difficulties were inherited by the National Convention when it met in September, 1792. The task of the Convention was not only to hold the armies together, but to strengthen them so as to make them capable of withstanding the combined forces of France's hostile neighbors. The French victories in the fall of 1792 furnished a breathing spell in which military problems could be attacked. Within the first six months, the Convention had begun the tasks of large-scale recruiting of manpower and of reorganization of the armies. In the latter connection, special importance was attached to the problem of uniting the old regular troops with the new volunteers so as to overcome the friction between these two groups.

The first efforts, however, proved insufficient. This fact resulted primarily from the lack of adequate means of enforcing military legislation. The excessive decentralization of government carried



out during the early years of the Revolution left the Convention without machinery for properly enforcing its will over the armies, just as it lacked means of asserting its authority over the local governments. The necessity of a more vigorous leadership to deal with the military and other problems of the day led to the creation of the Committee of Public Safety and of the Representatives of the People on mission.

These steps were not in time to save the Republican armies from near-defeat in the first half of 1793. Patriotic reaction to the dangers facing the nation in the summer of that year made possible the enactment, in August, 1793, of the famous levee en masse, the first modern example of total conscription of manpower and resources for war. The levy in mass furnished the armies with vast numbers of recruits. It was therefore possible, in the winter of 1793-94, to expand the armies to unprecedented size. At the same time, through the operation known as the amalgame, the regulars and the volunteers

were brought together in units which combined tactical maneuverability with administrative convenience. The work of expansion and reorganization was essentially completed by the spring of 1794.

The result of the Convention's efforts was that, in the campaigns of 1794, the Republican armies began their career of conquest which was to continue under the Directory and later under Bonaparte. Thus the army of Napoleon was essentially the creation of the Convention. The changes carried out under the Convention, made possible by the outburst of Revolutionary patriotism, coincided with important changes in military strategy which had been foreshadowed earlier, but which were not fully realized until the time of the Revolution. These developments brought about a radical change in the nature of warfare. The static, limited warfare of the eighteenth century disappeared, and the modern era of mass national wars began.

415 pages. \$5.19. MicA54-1566

## LANGUAGE AND LITERATURE

### LANGUAGE AND LITERATURE, GENERAL

#### A SURVEY OF NON-SHAKESPEAREAN BAD QUARTOS

(Publication No. 7952)

Dora Jean Ashe, Ph. D.  
University of Virginia, 1953

The purpose of this study is to expand the work of Sir Walter Greg and other scholars by applying to the largely uninvestigated non-Shakespearean bad quartos certain of the textual criteria which Greg found applicable to The Merry Wives of Windsor, Q1 (in his edition of 1910), Orlando (in Two Elizabethan Stage Abridgements: The Battle of Alcazar and Orlando Furioso, 1922), and Faustus (in Marlowe's Doctor Faustus, 1950). In general, the application of such criteria to these plays results in a strengthening of Greg's hypotheses that at least some reported texts were reconstructed to serve as provincial prompt books and that it is possible at times to determine the identity of reporters through a scrutiny of certain aspects of reported texts. Fourteen non-Shakespearean Elizabethan plays have been identified in previous studies as bad quartos: Orlando; Faustus; George a Greene; The Massacre at Paris; If You Know Not Me, You Know Nobody, Part I; Edward I; Philaster Q1; A Knack to Know An Honest Man; The Famous Victories of Henry V; Sir Thomas Wyatt; The True Tragedy of Richard III; Fair Em; The Fair Maid of Bristow; and John of Bordeaux. Eleven of these plays are listed in Mr. Leo Kirschbaum's "A Census of Bad Quartos," Review of English Studies XIV (1938), 20-43. The present survey is based on ten of these texts, excluding Orlando and Faustus, studied by Greg, and Edward I and Philaster, which the writer believes

to be non-reported and which are discussed briefly in an appendix.

Chapter I of the survey mentions briefly the usual identifying marks of bad quartos, cites the studies in which the fourteen non-Shakespearean bad quartos were identified, and presents charts containing printing and dramatic information about the fourteen plays. The dates of publication and probable composition of these plays provide support for Greg's belief that two periods in Elizabethan dramatic history, the plague years of the early 1590's and the briefer plague-period of 1603-4, were especially conducive to the production of reported texts. During these years the closing of the London theatres led to protracted provincial touring on the part of dramatic companies and to the production of both reported and non-reported provincial adaptations of popular plays. Of twelve non-Shakespearean bad quartos, excluding the probably unreported texts of Edward I and Philaster, eight date to the early 1590's and four to the early 1600's. Chapter II discusses the unique manuscript "bad quarto," John of Bordeaux, first identified by Mr. Harry R. Hoppe in his article, "John of Bordeaux: A Bad Quarto That Never Reached Print" (University of Missouri Studies XXI (1946), 119-132), and presents speculations, based primarily on this play, about the nature of the manuscripts underlying printed reported texts, particularly concerning possible editing and transcribing of the texts.

The two central chapters, III and IV, deal respectively with bad quartos as provincial acting-versions and with the identification of reporters. Chapter III consists of two parts, signs of prompt-book use or intent and signs of provincial adaptation. Signs of prompt-book intent are seen clearly in the manuscript John of Bordeaux (Chapter II), which was revised by two theatrical editors with a view to preparing the play for actual performance. Of the nine

printed texts, Fair Em contains three marginal stage directions suggestive of theatrical editing in the manuscript underlying Q1 (Chapter II); A Knack to Know An Honest Man contains stage directions which regulate the action carefully but at times suggest reliance on the knowledge of the actors, as "Enter the shew on the Stage" and the reference to the Crocodile's coming forth at D3, 18 and 13; The Massacre at Paris contains terse, often imperative directions which regulate the action carefully, for instance "Take him away" at C4, 21, a direction which does not appear in the one extant manuscript page of non-reported text; and George a Greene contains two possible actors' names in the text-proper, suggesting that the quarto-text had a close connection with some specific dramatic company. The stage directions in most of the plays exhibit occasional phraseology associated with the playhouse, such as the plot phrase "to them," as well as specifications for music and sound effects. Possible signs of provincial adaptation are found in The Massacre at Paris in the conscious abridgement of Guise's 16-line speech in the MS page to a brief but clear 4-line speech in the octavo (at C4, 16-20); in A Knack to Know An Honest Man in the probable additions of morality-play elements like the "Penitent Experience" theme; in George a Greene in the unskillful condensation of certain plot-elements presented more completely in the prose romance used as source material; and in all the plays except If You Know Not Me in the economy of cast and staging requirements and in the curtailment or the absence of passages not contributing to the advancement of the action. John of Bordeaux, A Knack to Know An Honest Man, The Massacre at Paris, and George a Greene exhibit fairly clear signs of reconstruction for performance in the provinces; four other plays present no positive evidence capable either of supporting or refuting the possibility of provincial performance; and one play, If You Know Not Me, calls for such an unusual number of supernumeraries and at times such complicated staging, that adaptation for performance in the provinces seems unlikely.

Chapter IV, on reporter-identification, presents in general an application only of the evidence of anticipations-recollections and other types of repetition and avoids the evidence of "well-reported" passages, since such passages in single-text plays are almost impossible to locate with any accuracy. Because the four lines of Guise's speech at C4, 16-20, when compared with the parallel passage in the MS page, reveal almost perfect reporting and because Guise borrows lines primarily from his own part rather than from the parts of other characters, it seems likely that the actor of Guise's role reconstructed The Massacre at Paris. The actor would almost certainly have been a member of Strange's and/or Admiral's provincial company of the early 1590's rather than Edward Alleyn, who played the part in London. Evidence of anticipations-recollections and other repetition points to the actor who played Henry IV-French King (doubled) as the reporter of The Famous Victories of Henry V; to the actors of the Duke of Venice and Lelio's parts in A Knack to Know An Honest Man; to Blunt in The

True Tragedy of Richard III; to Northumberland-Norfolk and Bret-Lieutenant of the Tower in Sir Thomas Wyatt; to Rossaclar in John of Bordeaux; and to Gage and the Clown in If You Know Not Me. No clear pattern is found in George a Greene, Fair Em, and The Fair Maid of Bristow; George a Greene is very likely a group reconstruction, and perhaps the other two plays also are. It is impossible to hazard theories concerning reporter-identity in single-text plays with any confidence, but the application of the evidence of repetitious phrasing seems to offer a more objective approach than do attempts to proceed entirely on the basis of well-reported passages.

Appendices present brief textual notes on Edward I and Philaster, lists of stage directions from the plays surveyed, and additional examples of anticipations-recollections and repetitious phraseology, supplementary to the examples cited in Chapter IV.

286 pages. \$3.58. Mic54-1567

#### AN EDITION OF ANDREW BOORDE'S BREVIARY OF HELTHE

(Publication No. 8276)

Woodrow Wilson Boyett, Ph. D.  
University of Michigan, 1954

Andrew Boorde's Breviary of Helthe was one of the most popular medical works printed in England during the sixteenth century. After the first edition in 1547, five reprintings were made, the first in 1552, the last in 1598. Unlike Boorde's other major works, The Introduction of Knowledge and The Dye-tary of Helth, which were edited by F. J. Furnivall for the Early English Text Society in 1870, no modern edition of the Breviary has been made. One possible reason for this neglect is that until 1946 no copy of the first edition of the Breviary was known. In that year, however, the Library of the University of Wisconsin acquired a perfect copy of the first edition as a part of the Thordarson Collection. The present edition is based on that copy.

The purpose of this edition of the Breviary is to make available to the general student of literature a little known work which is interesting and significant when studied along with some of the other outstanding works of the sixteenth century. Unlike the writings of Thomas More and Sir Thomas Elyot, which were meant primarily for the aristocracy, the Breviary, as Boorde explains, is intended for use by the common man. Again, unlike most of the better known popular literature of the early sixteenth century, which was concerned primarily with the religious questions of the day, Boorde's Breviary treats mainly of medical subjects; it is, however, almost encyclopedic in its range. There are chapters on demons and evil spirits, cosmetics, women, melancholy, lovesickness, and the like. The vocabulary used in discussing these varied topics and the scientific terminology employed in the medical portions of the book should be of great interest to the linguist and the lexicographer. Boorde's excellent sense of humor appeals to all classes of readers.

On the whole, the general editorial policy has been to preserve the text in the form in which it ap-



pears in the 1547 printing. An emendation was made only to correct an obvious error or to aid in interpreting an otherwise obscure passage. Textual notes show all significant difference in the readings of the 1547 edition and all subsequent editions. Fifty-five pages of explanatory notes are given. Indexes of the Latin, Greek, Arabic, and "Barbarous" medical terms which Boorde attempted to translate into English have been compiled. A complete English index is also provided. In addition, a comparison of the vocabulary of the *Breviary* with recordings in the NED has been made and the results summarized in the Introduction.

On the basis of information gleaned from the *Breviary*, an attempt has been made to judge Boorde as a man, as a physician, and as a writer. The conclusion is that in many respects Boorde is an excellent example of a transitional figure in the period when medieval ideas were beginning to give way to modern thought and practice.

The *Breviary of Helthe*, although not a masterpiece from either the medical or literary standpoint, is nevertheless a work deserving of recognition today. One of Boorde's most common prescriptions is to "use mirth and merry company," and not to study too much on supernatural matters which the mind cannot comprehend. This is still good advice, and reading parts of the *Breviary of Helthe* is an excellent way to follow it.

732 pages. \$9.15. Mic54-1568

**JAMES FREEMAN CLARKE: A PRACTICAL  
TRANSCENDENTALIST AND HIS WRITINGS**

(Publication No. 8244)

Derek Keith Colville, Ph. D.  
Washington University, 1953

Chairman: John Francis McDermott

The Transcendentalists have frequently been thought of as wild and impractical dreamers – victims of a "cerebral frenzy" as Professor Perry Miller describes the common impression. True enough, the Transcendentalists were the group of Bronson Alcott's educational theories and practices, of the Fruitlands experiment, of – from our view – the embarrassing intensity of Margaret Fuller, of the alleged strangeness of Jones Very, and, of course, of the experiences at Brook Farm. But it was not all like that. Transcendentalism was primarily a religious revolt which developed an intensely practical and social side, and James Freeman Clarke, for one, was representative of it.

Clarke, to whom students of the movement have devoted considerable attention during the last decade or so, was in the centre of the Transcendental group. Like others of its members, however, he has suffered from neglect because of the more general appeal of the work of Emerson and Thoreau – work which, despite its just popularity, is sometimes not characteristic of Transcendentalism as a whole. Clarke was a thorough Transcendentalist, on intimate terms with the better-known members of the group: he took a leading part in the Transcendental Club, contributed to the *Dial*, edited the

*Western Messenger*, and gave the address at Emerson's funeral. He expressed Transcendentalism clearly and logically. He was a highly practical man, and this practicality is the keystone of the whole enquiry.

The dissertation is essentially a demonstration of the vital practical and social strain in Transcendentalism, as seen with particular clarity in Clarke's life and writings. It is based largely upon manuscripts, some in the Houghton Library at Harvard University, but mostly privately held by Clarke's grandson in Boston. The dissertation also includes a critical assessment of Clarke's literary work, mostly published, which deserves some attention not only because of its artistic merit in a few areas – notably the sermon, the general and literary-critical essay, and the religious novel – but also because it forms a further demonstration of the characteristic strain of severe practicality in Transcendentalism.

Research on this mass of material showed that Clarke's entire life reflected this pragmatism in the most striking way. His years of building up a Unitarian church in Louisville, the church he designed and ran for half a century in Boston, and his efforts in social work, politics, and even technical invention all testify to it. It is present in all his literary work, sometimes, as in the case of the poetry, to that work's detriment; sometimes, as in that of the sermons, to its success. Always there is evidence of the significant combination – a mind thoroughly and sincerely Transcendental and at the same time completely practical.

265 pages. \$3.31. Mic54-1569

**THE SATIRIC CONTENT OF  
DISRAELI'S FICTION**

(Publication No. 8246)

William Henry Grate, Ph. D.  
Washington University, 1953

A partial revaluation of Disraeli's novels is made possible by reassessing the extent to which they criticize through ridicule the personages, manners, ideas, and institutions of Victorian England. In the political trilogy he ridicules for a rhetorical purpose those aspects of English political, social, and religious life which the Young England faction wished to change or to destroy. However, in *Lothair* and *Endymion*, in which such purpose is less evident, the author ridicules mainly in order to express his own feelings and opinions, necessarily masking and subtilizing his satire so as not to jeopardize his political position. In like manner the numerous satiric scenes in the early novels appear largely as ingredients of literary expression and are not directed to producing social amelioration. In general, the satiric content of Disraeli's fiction is greater than critics have hitherto realized.

An examination of contemporary magazine criticism of Disraeli's fiction reveals that few critics were aware of the extent to which the novels are satiric. Even so late as *Lothair* (1870) most re-



viewers dismissed the novelist-premier as a serious but incompetent writer. A few, however, notably Leslie Stephen and Lord Houghton, were becoming aware of the ironic mockery which pervades the romances.

Disraeli's propensity toward satiric writing is attested by his early works, particularly by *Popanilla* and the Lucianic satires, which were decidedly influenced by Swift and Voltaire. Though methods differ, the objects of Disraeli's ridicule in these early sketches are nearly the same as in the later novels.

In the novels he primarily criticizes the aristocracy. His main charge is that the nobles fail to exercise their right of leadership, wasting their time instead in frivolous conspicuous consumption which is often in bad taste. Though they boast loudly of their ancient blood, most nobles are actually of comparatively recent plebian origin. To their frivolity and snobbishness they join a rapacity which makes certain that they will secure their share and more of the growing wealth of the country. Disraeli's attitude is democratic in that he discovers in aristocrats no superior qualities resulting solely from their blood.

The wealthy and powerful lords and ladies are served and humored by numerous specialists who profit immensely by gratifying the whims and stroking the egos of the high and mighty. This section of the middle class Disraeli ridicules without mercy in virtually all of his novels. Noteworthy are architects, jewelers, cooks, and political technicians such as Rigby, Tadpole, and Taper.

Millowners and capitalists he generally spared, probably for reasons of political expediency, although he does ridicule a few peripheral types. Though they appear infrequently in the novels, the lower classes are always represented as ridiculous - as stupid, childish, and utterly unfit for political power. Not the least of their weaknesses is their propensity to imitate the aristocrats, or at least to envy them.

In addition to the criticism of social types, two themes of general satire recur throughout the novels. One is the plasticity of the mind and affections of youth, its susceptibility to adult influences, and the shameful way in which adults exploit this winsome weakness for their selfish ends. This theme is especially prominent in *Contarini*, *Tancred*, and *Lothair*. The second theme is the scornful treatment Disraeli accords unfeminine women who make a pretense of virtuosity or accomplishments which are usually the prerogative of males.

Perhaps nowhere in Victorian literature except in Disraeli's novels are the materials available for satiric treatment so subtly and so competently utilized. Yet much of this satire has escaped the attention of previous critics.

293 pages. \$3.66. Mic54-1570

BROWNING IN AMERICA: A STUDY OF  
BROWNING CRITICISM AND OF BROWNING'S  
REPUTATION IN THE UNITED  
STATES, 1839-1890

(Publication No. 7966)

Louise Greer, Ph. D.  
University of Virginia, 1953

Browning's first introduction to American readers came in the early 1840's, and by means of the

Bells and Pomegranates series, with early interest in the new poet almost entirely confined to the Boston area. American reviewers were slow in noticing him and the first extended criticism did not come until 1846. In 1849 James T. Fields brought out the first American reprint, an edition containing only *Paracelsus* and the *Bells and Pomegranates*. This was favorably reviewed and Browning expressed satisfaction with his transatlantic reception.

In 1855 *Men and Women* was issued by Ticknor and Fields, simultaneously with its publication in England; but in spite of its rich treasures this work inspired little enthusiasm among reviewers. Although *Sordello* had not yet crossed the Atlantic, reports of its obscurity had begun to exert a blighting influence. Also, literary conservatives, accustomed to a different style of poetry, were repelled by the Brownings and Tennyson. On the other hand, however, Browning's poetry frequently had a tremendous appeal for the younger generation and by 1861 he had won an enthusiastic audience of the "fit though few." Magazines began to solicit him for contributions and people were contrasting his American reputation with his lack of popularity in England, so that both he and his wife came to have a cordial feeling for the country whose culture they had formerly ridiculed.

The inevitable connection between an author's personal reputation and his literary fame is in Browning's case of unusual importance. His romantic marriage to a poetess more famous than himself tended to make his name better known. And the great number of Americans in his private life had the same effect. As soon as he settled in Italy he began to be intimate with the expatriate artists there; and he and his wife entertained in their home countless literary pilgrims, who brought back to America intimate accounts of the wedded poets.

After the death of Mrs. Browning, in 1861, and Browning's return to England, Americans continued to fill a large place in his life. As one of the greatest diners-out in London he met, as a matter of course, almost all distinguished Americans who came there. Many others, as in Italy, beat a broad path to his door and were always cordially received.

The period from 1864 to 1871 was one of fluctuating criticism. A pirated volume made up of *Sordello*, *Strafford*, and *Christmas-Eve and Easter-Day* received little attention. Nor did *Dramatis Personae* fare much better. But when *The Ring and the Book* appeared all the reviewers took notice, most of them with enthusiasm. Like the English reviewers, they objected to Browning's disregard for the canons of art but had great praise for his creative ability and the ultimate, overpowering effect of the poem. Then, after this spurt of interest, most periodicals failed to announce *Balaustion's Adventure*. A comparison of the printing figures at this time (1871) indicates that the American public was no longer outstripping the British.

Reviewers made devastating attacks on the long psychological works of the early 1870's, objecting to both their matter and their manner. The poet at this time lost many of his old admirers, and the successors of Ticknor and Fields stopped buying advance sheets of the volumes which continued to ap-



pear in England. His American publishers reprinted the *Pacchia rotto* volume in 1876, but after that they ceased to take even a piratical interest in Browning. Throughout this recession of the 'seventies, however, the earlier, more poetic works continued to sell – slowly but steadily – and there were always some devotees who admired the later ones.

In the 1880's, when a wave of culture was sweeping over the country, Browning societies sprang up everywhere, their membership constituting a representative cross section of American society. Some members were drawn into the societies by a genuine interest in Browning's poetry – its beauties, its puzzles, or its philosophy – while others joined only because of "the Browning fever." In their studies the societies unduly emphasized the poet's meaning, and their criticism was further vitiated by hackneyed ideas and expressions and by extreme partisanship. Thus they became objects of satire and ridicule and exerted some adverse effects on Browning's reputation and popularity, although he himself always felt kindly toward them.

In 1882 Browning's American publishers began to issue his works again, and critics adopted a tolerant attitude toward his form. Periodicals made him flattering offers; Browning readings and lectures became popular; and Lawrence Barrett revived, with some success, *A Blot in the 'Scutcheon*. During the last half of the 'eighties his personal popularity was at its height, and he was showered with attentions. His private life was a matter of speculation and the prevailing conception of the old poet was that of a man of youthful mind and vigor.

In spite of his seventy-seven years, Browning's death was felt to be premature and came as a shock to his followers. Memorial services were conducted by the societies and the critics held a post mortem examination to decide his place on Parnassus, their conclusion being that posterity would reject the long philosophical works and that his chief claim to fame lay in *Men and Women*, *Dramatis Personae*, *Dramatic Romances*, and *Dramatic Lyrics*, and in a few short pieces from the other volumes.

434 pages. \$5.43. Mic54-1571

\*Published, with additions and revisions, as *Browning and America*. (The University of North Carolina Press, 1952.)

The *Kitāb al-Jihād* from Qādī Nu'mān's  
DA'Ā'IM AL-ISLĀM:  
TRANSLATED WITH INTRODUCTION  
AND NOTES

(Publication No. 8256)

Gerard George Salinger, Ph. D.  
Columbia University, 1953

The *Da'ā'im al-Islām* (Pillars of Islam) is one of the most famous works of religious literature produced during the Fāṭimid period. It was compiled by the Fāṭimid Qādī an Nu'mān b. Muḥammad b. Maṣṣūr b. Aḥmad b. Ḥayyūn at-Tamīmī al-Maghribī (d. 363/974) under the personal supervision of Caliph al-Mu'izz, and was intended to offer a handbook of Muslim law under the form of a Ḥadīth-collection arranged systematically according to the

different legal matters usually dealt with in such works.

This work was inaccessible to Western scholars until 1951 when there appeared in Cairo the first volume of an edition prepared by A. A. A. Fyzee, the then ambassador of India to Egypt.

The choice of the *Kitāb al-Jihād* for translation and investigation is justified by the real importance of *Jihād* for a proper understanding of Islamic religion and society. This is the first time that the opportunity has arisen to study the subject in an authoritative Ismā'īlī source.

The investigation has shown that:

1. The legal rules for Holy War laid down in the *Da'ā'im* prove to be in accordance with general Islamic law.

2. The historical material used is for the most part the same as that found in Sunnite literature, but shows sometimes a strong Shī'ite coloring without specific Ismā'īlīte-Fāṭimid features.

3. The *Mirror for Princes* inserted in the book and constituting one-third of the whole follows a pattern well established in *adab* literature. However, a comparison of it with another version preserved in the *Nahj al-balāgha* leads to the discovery of important differences. These in turn allow conclusions which may well throw light on the political life of the second part of the tenth and the beginning of the eleventh century A. D. This may suggest that the *Mirrors for Princes* as well as other works of *adab* literature can yield new results if submitted to the critical method developed by Goldziher and Wellhausen for the study of Ḥadīth and historical tradition.

150 pages. \$1.88. Mic54-1572

LANGUAGE AND LITERATURE,  
MODERN

THE STRUCTURE AND SIGNIFICANCE OF  
THE MARBLE FAUN

(Publication No. 8279)

Merle Elliott Brown, Ph. D.  
University of Michigan, 1954

Past criticism of Nathaniel Hawthorne's *The Marble Faun* raises several problems which this study undertakes to solve: whether the themes of the novel are consistent or basically contradictory; whether the plot is well formed or not; whether the characters are lifeless and unnatural, or lifeless from only one point of view; and whether or not the setting is subordinated to and integrated with the narrative.

The attempt to solve these problems is made through a detailed analysis of the novel. This analysis is governed by the belief that the novel is composed of four similar parts all of which are subordinate to the single idea of the transformation from innocence to experience. In each of the parts a different character becomes the narrative center and undergoes a profound change which is a realization of the central idea of the novel.

In the second chapter the study presents an analysis of the plot of *The Marble Faun*: it is a combination of the conventional kind of plot and a single

pattern which is realized four times, once in each of the four parts of the novel. This unusual plot-structure suggests a set of consistent meanings which are shown to be, in fact, realized through it.

The third chapter describes three ways in which Hawthorne creates the characters: through symbols, character sketches, and highly suggestive actions. The study presents these devices, in detail, as Hawthorne uses them to create Hilda; it then touches lightly upon a few problems concerning the other three main characters; and, finally, it analyzes several scenes in which Hawthorne works the points of view of the various characters against each other. The study shows that Hawthorne creates his characters not so much through symbols and sketches as through actions suggestive of contradictions within an actor himself and conflicts among the various actors.

The scenes of *The Marble Faun* are analyzed in the fourth chapter. The analysis reveals that all the scenes have two kinds of meaning, literal and symbolic. All of them are thus charged with significance, although none is allegorical because both the literal and symbolic meanings are important in themselves.

In the next two chapters the study describes the metaphors and symbols. By means of them, Hawthorne establishes relationships between the present and the past, the actual and the possible, the natural and the human, and the human and the divine. The figures of speech upon which these relationships are based stem from the setting of the novel, that is, Rome and Tuscany. This setting gave Hawthorne the opportunity to present quite rich and profound themes.

The study leads to the conclusion that *The Marble Faun* has a well formed plot, characters which are lifelike if viewed rightly, and a setting which, as used to create symbolic scenes and as the source of quite significant metaphors, is subordinated to and integrated with the narrative. The themes, according to this study, are consistent and, in richness and complexity, go beyond those of Hawthorne's earlier works. Thus, it seems that Hawthorne's last complete novel is the climax rather than the decline of his career as a novelist.

219 pages. \$2.74. Mic54-1573

**THE MYTH OF THE AMERICAN COWBOY:  
A STUDY OF THE CATTLEMAN'S  
FRONTIER IN HISTORY AND FICTION**

(Publication No. 8188)

Julian Ernest Choate, Jr., Ph. D.  
Vanderbilt University, 1954

Supervisor: Professor Richmond Croom Beatty

For more than half a century the cowboy has existed as a popular American folk hero. A very large body of literature has been written about him — a literature labelled as the "realistic Western libel." The American cowboy has become the composite prototype of the frontiersmen who civilized the Great Plains. No other class of Westerners played a more gallant role in this undertaking than the range rider.

This study proposes to reveal the cowboy in his historical role on the plains frontier in relation to the fiction written about him between 1890 and 1915. This

general period is the focal point for such a study, for all the fiction written before 1890 is largely sub-literary; and the literature written since 1915 is largely of the same pattern and quality as that written between 1890 and 1915.

Frederick Jackson Turner compelled a new interest in the interpretation and evaluation of the frontier after he delivered his famous frontier thesis in 1893. Mark Twain and others were acknowledged to have made primary contributions to American literature of the highest quality. And the cowboy became a dominant folk hero in millions of copies of novels and short stories.

The use of the term, *myth*, is employed in this study to differentiate between the historical reality of the cattleman's frontier and the romanticized fictional treatment of that frontier in literature. The beliefs and practices of the cowboy as reflected in Western literature are not necessarily true. Often they are egregiously in error.

The original Western cowboys, the trail drivers of Texas, conquered the tradition of the Great American Desert when they trailed millions of longhorns into every habitable part of the Great Plains. The trinity which transformed the plains regions into Anglo-American community were the cowboy, the Texas longhorn, and the Spanish mustang.

The Texas "long drive" originating in the Nueces Valley in Texas was the greatest pastoral movement of its kind in recorded history. The cowboys who trailed the longhorns fought off savage Indians, swam the deepest rivers, and traversed thousands of miles of virgin lands. The trail drivers became the range riders when the vast dominions of the northern plains were wrested from the buffalo and Indian to become the grazing grounds for the Texas longhorns.

The American cowboy in frontier days was no myth but a living reality. He was generally a Texas youth who had been reared on the frontier. He understood the lore of the longhorns; the six-shooter and a rifle had been his constant companions, for the Comanche Indians had made his existence precarious. A few of them became lawless; most of them made the finest citizens of Texas.

The Great Plains area was first known as the "Wild West," for savage Indians and wild beasts roamed its reaches. It became the "Lawless West" when the Americans came. The claim that the West was lawless is true in many respects. The six-shooter was used against the Indian, but more often by the whites against each other. But with the stabilizing of the frontier, law and order were established, and the law of the six-shooter became obnoxious.

A literature of the Great Plains occurred as a result of the Anglo-Americans who settled in Texas and California and who followed the ranching occupation. A ranch fiction was written before and after the Civil War. The cowboy was not featured until the dime novel appropriated him in 1887.

Owen Wister gave the cowboy a new birth in fiction when he wrote "Lin McLean Goes East" in 1892. Alfred Henry Lewis contributed a minor humorous Western classic five years later when *Wolfville* was published. Wister's *The Virginian*, published in 1902, has remained a classic in popular Western literature. Andy Adams wrote the



outstanding cowboy classic in *The Log of a Cowboy*, published in 1902. Other superior writers in this period were Emerson Hough, Stewart Edward White, Henry Wallace Phillips, George Pattulo, O. Henry, and Hamlin Garland. The popular writers, led by Zane Grey, included such names as Dane Coolidge, William MacLeod Raine, B. M. Bower, Clarence E. Mulford, and others. More than thirty outstanding writers contributed in the general period of this study.

The literary criticism written about this Western literature is limited. And almost all that is dependent upon such critical statements which Walter Prescott Webb makes in *The Great Plains*.

469 pages. \$5.86. Mic54-1574

#### PASCAL VU PAR L'EPOQUE ROMANTIQUE

(Publication No. 8164)

Jean-Jacques Demorest, Ph. D.  
Princeton University, 1950

The Eighteenth Century had taken a strongly opinionated dislike to Pascal. Voltaire, considering him a very personal opponent, spared nothing in trying to destroy the apologist's reputation. He made a particular point of exaggerating the intuitive and anti-rationalistic aspects of Pascal's thought, hoping thereby to weaken its validity. He even suggested that the apologist's "fanaticism" was the result of a melancholy madness. However, Voltaire's efforts were of little avail; for his very insistence on the apologist's intuitive message and on the man's mournful disposition explains the striking popularity of Pascal among the first Romanticists. Voltaire's death marks the beginning of Pascal's rapid recovery of public favor and his decisive rehabilitation.

A widespread movement, in which Fontanes played a dominant role, redeemed Pascal's personality and exalted the poetic aspects of his *Pensées*. Even Napoleon was sympathetic to the sudden rise of Pascal's fortune. An illustration of his deep personal influence is found in the life and the writings of Maine de Biran. The latter's spiritual development was patterned after that of Pascal's unbeliever. Under the guidance of and, even more, in intimate association with Pascal, Maine de Biran progressed from sensationalism and agnosticism to a very personal idealism and faith.

Notwithstanding Joseph de Maistre's stubborn reticence towards Pascal, the apologist's reputation was firmly established during the Empire. The greatest single contribution to his regained stature was that of Chateaubriand. He saw in Pascal a forerunner, a man of his own spirit. He considered his *Génie du Christianisme* as a continuation of Pascal's Apology, consequently he bent all of his efforts to reviving Pascal and making of him a contemporary. In order that Pascal be sympathetically understood, he stressed the man's personality and the stunning originality of his genius. Moreover, Chateaubriand shared his admiration for Pascal with his friends: Ballanche, Chénedollé, Joubert and Fontanes; all of

whom were fellow-Pascalians. No doubt, Chateaubriand thought of himself as a modern Pascal, but his contemporaries did not recognize his pretension, it was upon Lamennais that this painfully acquired honor was bestowed.

To the Romanticists Lamennais was a contemporary embodiment of Pascal. Upon him they built their spiritual hopes and aspirations. Everywhere a daring and impetuous parallel was made between Lamennais and the apologist. And for long years the romantic priest lent himself to this flattering yet demanding comparison. Pascal prompted the *Essai sur l'Indifférence*; he was the great inspiration of Lamennais' orthodox period and maintained the fiery priest in the fold. Nevertheless, he could not satisfy Lamennais' social philosophy, every day the disparity between the two became more apparent, until the priest broke off with Rome and with Pascal, tacitly implying in this fashion that Pascal's faith was irrevocably catholic. Despite its outcome, the romantic Pascal gained a great deal in this relationship: he became more alive, more closely bound to romantic faith.

The Voltairian interpretation of Pascal was not dead however. It reappears occasionally through the romantic period, and particularly in Cousin's view of Pascal. His interpretation can aptly be defined as a romantic projection of Voltaire's, his main tenet being that Pascal was at heart a skeptic. Cousin's claim was all the more sensational since he uncovered the original manuscript of the *Pensées* in a state of disorder and contradiction which seemed to warrant his thesis that Pascal's faith was not firm and unequivocal.

A protestant, Vinet, rose in defense of Pascal and demonstrated the absurdity of Cousin's theory by placing the apologist in the true light of his faith and by declaring that he could not be separated from Jesus, his example, his aim and end. Sainte-Beuve took over much of Vinet's christian interpretation, but his lasting contribution was in striving to offer a real Pascal stripped of his romantic trappings and accurately situated in the time and the society to which he belonged. In this sense Sainte-Beuve's interpretation was a strong reaction to that of the Romantics.

One fact stands out in the study of Pascal during the Romantic Period: namely, that we owe Pascal's extraordinary vitality today to the Romanticists' sincere admiration for his example and their enthusiastic insight into his philosophy.

302 pages. \$3.78. Mic54-1575

#### THE FRENCH IMAGE OF AMERICAN CULTURE: 1752-1803

(Publication No. 8165)

Durand Echeverria, Ph. D.  
Princeton University, 1950

The purpose of this study is to determine by an examination of the works of French writers the evolution of the image of American culture in the French



mind from its first appearance to the end of the Eighteenth Century. Culture is taken as indicating the intellectual and aesthetic content of a society as manifested in the arts, sciences, learning, education, thought and manners. It does not include morals, religion, politics, economics or the physical instrumentalities of a civilization.

The variations of human thought being what they are, no absolute generalities are possible, but certain trends of opinion were evident and certain common places gained wide currency. On the basis of these, conclusions are possible. Three general ideological developments can be determined.

The first, the Theory of American Degeneration, stated that the climate of the New World caused all forms of life, including man, to regress or stagnate, and that therefore any colonial culture, including that of the United States, would necessarily be inferior. This idea, suggested by Voltaire, was developed by Buffon and De Pauw and popularized by Raynal. In spite of retractions by Raynal and Buffon and many refutations, it remained vital to the end of the century, though secondary after 1776. Partly a defense against Primitivism, partly an expression of anti-colonialism, it was essentially a manifestation of the prevalent reaction against the ex-Pansionist forces in European civilization.

A contrary development was the American Dream, the idea that America had achieved a society which combined democracy, liberty and equality with moral simplicity and purity and a high state of culture. This current had its origins early in the century, became dominant in 1776 and reached its peak in the years 1783-1793. It was characterized by excessive admiration for American political thought, learning, science, education and even literature. This admiration, which was powerfully reinforced by the examples of such men as Jefferson and Franklin, was a product of the enthusiasm for American liberalism, plus the faith, in accordance with the Idea of Progress, that political and social advances were paralleled by progress in knowledge and reason.

After the Revolution a new and contrary image arose, first among the Emigrés and later in France, of America as a young barbaric nation, vulgar, materialistic, mercantile, rationalistic, equalitarian, and culturally inferior. This sudden shift in opinion is ascribed to the fact that the Revolution destroyed the motive for the idealization of American democracy, and to the rise of a new set of assumptions governing men's thinking: a new hierarchy of values, nationalism, relativism, and political reaction. All opinions were not unfavorable; a surprising number of the Emigrés and travelers of the 1790's praised America, and opinion in France was more favorable than not. Moreover at the close of the century the inveterate Liberals, such men as Du Pont de Nemours and the *Idéologues*, still saw America with its intellectual freedom and equality of opportunity as the sole hope of a world drifting back to absolutism. Nevertheless, pessimism on American culture was the dominant and increasing trend at the end of the century.

The ultimate and essential question which

American culture posed to the French was whether a free, equalitarian and democratic society advanced culture by liberating and stimulating the human mind, or whether it debased culture by reducing all men to a common level of mediocrity.

The general conclusion is that through all this period the astounding interest in America was caused by the fact that French thinkers recognized that the experiments being conducted in America were highly pertinent to French problems; whether these observers were favorable or not, whether they were seeking models or suggestions or warnings of dangers to be avoided, they all followed the events with intense interest because they saw in America lessons which could be applied in France. They wrote about America but they were thinking of Europe. As a result, the image of American culture was always refracted by this preoccupation and fluctuated from one distortion to another. Thus for this period at least the image was not a reflection of conditions in America, but a function of the state of the French mind.

872 pages. \$10.90. MicA54-1576

#### THE WRITER AS HERO IN IMPORTANT AMERICAN FICTION SINCE HOWELLS

(Publication No. 8297)

Elsie Fannie Louise Edmondson, Ph.D.  
University of Michigan, 1954

The purpose of this study is to show the relation between the writer-heroes created by six important American authors: William Dean Howells, Henry James, Frank Norris, Jack London, James T. Farrell, and James Branch Cabell, and their concepts concerning the novel and the novelist. In an age changing at such a rapid rate that it is hard to keep pace with, much less record, the changes, society presents a challenge to the poets and philosophers - workers in any literary genre - to try to interpret the complex environment's impact upon the human spirit, and to clarify and resolve resulting conflicts through their books. With the role of the writer in question these serious writers, perceiving themselves to be in a wider sense protagonists in society, have clarified the problems faced by the writer by creating writer protagonists who live in the kind of universe posited by their creators and are faced with the same fundamental problems. The fiction centered around these protagonists illustrates the creator's ideals regarding the writer; moreover, each illustrates his creator's best thoughts on how the writer achieves or sacrifices integrity.

The genteel realists, Howells and James; the naturalists, Norris, London, and Farrell; the romanticist, Cabell, each proclaims one truth: that he who would be a serious writer must achieve and maintain a basic integrity by giving truth as he conceives it within the framework of the kind of universe he posits. Clothed in a form perfected in consonance with the writer's theory of life and art, this truth is his art, a critique of beauty and truth, human existence, and the eternal verities.



Autobiographical and critical writings of each author have been explored to discover concepts regarding the universe, art, and the ideal writer, and the concepts discovered related to the concepts clarified in fiction by their protagonists. Howells and James posit a moral universe, in which the protagonists have freedom of choice, and may achieve and maintain integrity. Basil March, Howells' chief protagonist, becomes ideal realist when he can probe human nature, portray it truthfully. James probes the souls of his protagonists, makes it clear that the artist must make supreme sacrifices for his art.

Norris eschews realism because it stultifies itself. He posits, with reservations, a deterministic universe. His protagonists, in a sense organisms, master and dominate circumstances, in spite of determining forces. Ideally, they achieve integrity through awareness or becoming-awareness, with reference to the environment. London's Martin Eden creates out of the concept of the fundamental unity in the universe, and by writing what he knows achieves integrity. He functions as individual; when his will is shattered, he cannot any longer function. Farrell postulates a deterministic universe, to which Danny O'Neill and Bernard Carr orientate themselves. Danny creates out of experience, writes truth. Bernard, keenly aware of forces that beat upon him, is nevertheless driven to write as he feels and wants to write — thereby achieving freedom, the priceless ingredient in his integrity.

Cabell, positing a Cabellian universe shaped by a demiurge who is a Great Romancer, creates protagonists who roam at adventure through its avenues and bypaths, the while that they play with commonsense, piety, and death. He makes it clear that the romanticist can achieve and maintain integrity only by avoiding the corrupting influence of reality.

No ideal protagonist may concern himself too much with monetary gain. Vulgar success affronts some.

Each author proclaims that a writer who would meet the challenge of society must, in the face of whatever difficulties and temptations, write truth as he conceives it, and thereby achieve and maintain basic integrity. 274 pages. \$3.43. MicA54-1577

#### AN ANALYSIS OF CHARACTER TYPES IN THE NARRATIVES OF GERTRUD VON LE FORT

(Publication No. 8302)

Joseph Adam Fihn, Ph.D.  
University of Michigan, 1954

The purpose of this study is to show that through their ideas and attitudes Gertrud von le Fort's characters represent religious orientations that constitute progressive stages in approaching God, and that they may be subsumed under the following headings of types: The Anthropocentric, The God-seeker, The Theocentric, and The Mystic.

The introductory chapter supplies a biographical

sketch of the author, the background that is necessary for this study, and the framework within which it is made. This is followed by the body of the investigation, which consists of four chapters, one for each of the character types treated. Each of these chapters contains a broad philosophic and descriptive definition of the type under consideration. Those characters fitting under the type-heading are analyzed according to the chronological order of the books in which they appear. By means of quotations, illustrations, and the interpretations of the most reliable critics, evidence is gathered which proposes to establish the justification for the classification of each character.

In the final chapter the philosophico-theological orientation of the author, as evidenced by the works studied, is critically examined with a view to illuminating the values represented by her characters both individually and by type. It is shown that both her characters and her favorite themes follow naturally from the primacy she gives to theological matters. Through a critical examination of her merits as an artist certain literary kinships emerge which are subjected to a comparative study. The author's salient shortcomings, which are thus revealed, are then considered in connection with a speculative appraisal of her permanent place in German literature.

The conclusions at which this study arrives are that Gertrud von le Fort holds all her characters up to the same standards, the standards of the role for which they have been cast by their Maker, and that by these standards they fit into the four-fold classification of types analyzed. It is shown that all of the author's works are but a single study of the manner in which ultimate and absolute values are acknowledged and realized in the lives of character types that are representative of virtually every segment of human society and of every philosophico-theological position known. It is established, further, that the author constantly keeps her own values in full view because she frankly desires that men should share them. 285 pages. \$3.56. MicA54-1578

#### THE RECEPTION OF MAX NORDAU'S DEGENERATION IN ENGLAND AND AMERICA

(Publication No. 8305)

Milton Painter Foster, Ph.D.  
University of Michigan, 1954

One of the aims of this historical study is to present an accurate record of the literary controversy produced by Max Nordau's *Degeneration*, a book of literary criticism that makes use of psychopathological information to establish the thesis that most of the eminent artists of the latter part of the nineteenth century were mental degenerates. Another aim is to discover as many valuable criticisms of modern literature and art as possible in the books and magazine articles replying to Nordau.

This study consists of three main parts: one chapter on the nature of Nordau's attack, three

chapters on the immediate reception of his book, and one chapter on later reactions to the book. Chapter One considers the genesis of *Degeneration* and then presents a brief summary of it. Chapter Two covers favorable responses, drawn chiefly from magazines, to Nordau written between 1894 and 1897. Chapter Three is concerned with replies opposing Nordau written during the same four-year period. Chapter Four presents summaries of three longer works, also written between 1894 and 1897, *Regeneration* by Alfred Egmont Hake, *Genius and Degeneration* by William Hirsch, and *The Sanity of Art* by George Bernard Shaw. Chapter Five deals with reactions after 1897 in various forms to Nordau's *Degeneration*.

The analysis of the reception of Nordau's book reveals that while many conservative reviewers greeted it favorably, praising Nordau's qualifications and seconding his ideas, another, larger group of critics hotly opposed him, sometimes finding him temperamentally unsuited to criticize art, sometimes finding fault with his methods, and sometimes disagreeing with his ideas. According to contemporary observers and historical evidence the three longer works replying to Nordau by Hake, Hirsch, and Shaw demolished Nordau's argument. Although Nordau was pronounced the loser of the debate, the several references to his book in writings since 1897 indicate that it is still of interest to literary historians, philosophers, psychologists, psychopathologists, and literary and art critics.

Three general conclusions are reached in this study. (1) The controversy over *Degeneration* reveals various aspects of the cultural atmosphere of the *fin-de-siècle* period, such as what subjects excited the reading public and attitudes toward art. (2) Nordau's book foreshadowed later developments in twentieth-century criticism, including the beginnings of psychoanalytical criticism of art and attacks on modernism. (3) *Degeneration* and the reactions to it contribute to the understanding of artistic movements of the modern era. Nordau set forth a summary of the chief artistic tendencies of his day, and by denouncing them he stimulated his repliers to defend the new art by explaining its special characteristics and stressing its values.

342 pages. \$4.28. MicA54-1579

THE FRENCH CREOLE DIALECT OF  
MARTINIQUE: ITS HISTORICAL BACKGROUND,  
VOCABULARY, SYNTAX, PROVERBS AND  
LITERATURE. WITH A GLOSSARY.

(Publication No. 7961)

Henry Elwell Funk, Ph.D.  
University of Virginia, 1953

This dissertation is a study of the French Creole dialect of Martinique, French West Indies. As the phonology and morphology of the dialect have already been treated by the writer in an M. A. thesis, this study does not touch upon those fields. It does consider the historical background of the dialect, its syntax, and the composition of its vocabulary. There

are examples of proverbs and idioms, and a section showing the literary possibilities of the dialect, in the form of humorous verse, folk-tales, song and serious poetry. The work has been divided into a preface, four chapters and a glossary, totalling 307 pages.

The preface explains that the writer's experience with the dialect dates from a visit to the islands before World War II, and is based upon a speaking knowledge of the patois. Mention is made of the chief writers on French Creole of the West Indies: Ducoeur-Joly, Abbé Goux, Achille Marbot, H. J. Thomas, St. Quentin, Turiault, Poyen-Bellisle, and more recently Jules Faine, Suzanne Comhaire-Sylvain, Douglas Taylor and Robert A. Hall. A brief appraisal is given to the work of each.

Chapter I provides a brief history of the island, outlined only to sketch in the general background against which the dialect developed. Chapter II deals with the historical background of the dialect, in which will be found the earliest examples of the language in the notes of Jacques Bouton in his *Relation de l'établissement des François depuis l'an 1635 en l'isle de la Martinique*, Paris, 1640. Used between Carib Indians and French settlers, this early jargon consisted for the most part of Spanish or French words and much reliance on gestures. The only tangible evidence of Carib influence in the present-day dialect is found in the vocabulary, in which a good number of Carib words are preserved.

In the section called "The French Contribution" it is explained that the present pronunciation of Martinique Creole is remarkably similar to that used in Paris and the surrounding provinces in the seventeenth and early eighteenth centuries. While the majority of the first settlers on Martinique were from Normandy, as shown on a table provided, a brief examination of the phonetic traits of the most important French dialects shows that they had no general influence on the pronunciation of the dialect.

The Negro contribution is discussed in another subdivision, which considers the French slave trade, the population figures for whites and Negroes in Martinique from 1640 to 1788, the African tribes from which the slaves were taken, some examples of 1650 showing the Negroes' broken French, opinions of several writers considering the amount of influence the Negroes had on the formation of the dialect, and new material showing distinct parallels in construction between the Creole of Martinique and West African languages.

Chapter III deals with the present state of the dialect as regards its linguistic features. The opening section discusses the general cultural background, the people who speak Creole, the various "levels" of Creole speech, the education of the natives and the effect of schooling on the dialect. Another section explains the orthography employed in the study. A modified French spelling has been used, since there are often two or three pronunciations of a given Creole word; Fr. *aimer* can be found in Creole as [êmə], [êmē] and [îmî]; it has been noted here as *ainmên*. A table of the system used is given.

The third section discusses the Creole vocabulary, showing that the bulk of the lexicon consists of



French words pronounced in a manner suggesting seventeenth century standard French. There is given a list of Creole words which have developed different meanings from those which they have in standard French; another list explains words which have been newly formed in Creole. Instances are found of words common in Old French which have been dropped in standard French, but which continue to live in everyday Creole. Other Creole words are shown to be of Carib, Spanish, Norman and African origins. There are also listed some thirty-five Creole words of unknown or uncertain origin.

The section on syntax treats of the various parts of speech in the dialect, with examples and translations, including a fairly extensive discussion of the particle *ka* as used to show continuing action, and a recognition of the existence of a subjunctive form in Creole, of four forms of the infinitive, and of the present participle. Verbal directives (i. e., *pòté allé* = *porter aller*, "to take away," "to carry off," seem definitely to be of African origin. A section on clauses of various types completes the syntactical study.

Chapter IV, "The Present State of the Dialect: Cultural and Literary Considerations," offers a collection of Creole proverbs, including those noted by Lafcadio Hearn, Poyen-Bellisle, and Elsie Clews Parsons. There are a few pages of commonly used similes, showing little originality, as most of them have been taken from French. Idioms and figures of speech are treated in a ten page section, with examples from Labrousse and Elsie Clews Parsons. Concluding this section are selections from writers in the dialect: a poem from Marbot (1846), a fragment noted by Hearn (1890), two stories written down by Mrs. Parsons (1920's), a political song from Victor Coridun's collection of Creole *chansons* which he gathered from 1920-1925, and a poem by Gilbert Gratiant, who writes verse in the spoken dialect, rather than in an artificial literary version of Creole. With the possible exception of Marbot's work, all of these selections constitute valid examples of the present-day spoken dialect.

The study is completed with a glossary of 145 pages, in which examples of the more puzzling words in the dialect may be found, with illustrations of their use, and their etymologies. In each case a phonetic transcription is added. Many of the more curious of Mrs. Parsons' Creole notations have been entered and explained here. Attempts have been made to discover the origins of such Creole words as *béke*, *brénên*, *ënni*, *éti*, *Gaoulé*, *grage*, *iche*, *javà*, *ka*, *lélé*, *macaillé*, *mi*, *oti*, *pichônên*, *piétèu*, *rété*, *safe*, *sambouya*, *ta a*, which heretofore have not been satisfactorily explained.

328 pages. \$4.10. MicA54-1580

## MARK TWAIN'S USE OF NATIVE AMERICAN HUMOR IN HIS PRINCIPAL LITERARY WORKS

(Publication No. 8190)

Charles Buford Havens, Ph. D.  
Vanderbilt University, 1954

Supervisor: Professor Richmond Croom Beatty

The humorous formulas, themes, devices, motifs, and attitudes which Mark Twain wove into his principal literary works are perhaps the most representative of the traditions of native American humor of any works ever assembled by a single author. Amazing in its variety and complexity, Twain's humor covers, without apparent system or plan, the range and scope of the four "schools" of native humor. Twain would not be limited by regional boundaries; he drew his materials and inspiration from whatever place seemed appropriate - from the Down East writers, the Humorists of the Old Southwest, the Literary Comedians, or the Local Colorists - and made them his own.

Chronologically, Twain was favored insofar as his career as a humorist is concerned; for, he was in a unique position to avail himself of the great wealth and variety of the native traditions that were flourishing in his early years. Providentially, he was born in the 1830's, the decade that marks the emergence into print of an ever-increasing amount of traditional humorous writing which was characterized by what has been termed "an emphatic native quality."

In his variegated career as a printer's apprentice, a Mississippi steamboat pilot, and an inquiring traveler, Twain had absorbed as much of the soul of American humor as any writer of the time could have done. He knew the traditions, the formulas, and the themes so well that they became an intimate part of his life and of the life he was to depict for the reading public.

Unfortunately, such a rich acquaintance with native humor was not an iron-clad assurance of Twain's success as a literary artist. Perhaps, somewhat paradoxically, his wide knowledge of his source material might partially have been a hindrance to him; it might have been that he knew the humorous traditions so well that he, in a sense, became inhibited by allowing himself to sacrifice his literary craftsmanship to the conventions of the traditions.

The impact of native humor has always resided, for example, in its explosive and anecdotal nature. Springing from the native tradition and caring little for the tenets of literary critics, Twain wrote, for the most part, in the manner of his unlettered tutors and concentrated upon the episode rather than upon the artistry of the work as a whole.

Notwithstanding such apparent concern for the effectiveness of individual passages, Twain seems in a few of his episodes - for which there appear to be as many as two or three, or perhaps even more, extant variants that might have influenced him - to have been unable to offer a more effective version than one or more of his probable predecessors had done.

Many of the native humorists whose exaggerations, clever ruses, burlesques, and humorous local color sketches had foreshadowed Twain's were highly skilled technicians in the craft of backwoods humor. Because most of them – all but the literary comedians – limited their scope to particular provincial types and subjects, they frequently became specialists in their own brand of humor. Because of his proclivity for expansiveness and inclusiveness, Twain simply could not outstrip them all.

Viewed in the large, the bigger portion of Twain's greatness as a humorist would seem to come from his unsurpassed ability to capture the vast but evasive bulk of the living humor that was representative of backwoods America and to preserve on paper its multifarious and complex nature; for, it would appear that the chief literary theory that motivated Twain's humorous writings was that he should be native, sympathetic, and true to the society with which he dealt. In his wide use of traditional materials there would not seem, therefore, to be any question of conscious plagiarism involved; to Twain there was only the challenge of reporting or recording the theme, the manner, and the idiom in a more authentic vein than had ever been done before.

368 pages. \$4.60. MicA54-1581

DECORUM IN ENGLISH VERSE  
ca. 1569-1700

(Publication No. 8121)

George Troxell Hemphill, Ph. D.  
University of Minnesota, 1954

Chairman: Huntington Brown

From the time when metrical theory applied to English verse begins, with Puttenham, to the time when wide agreement as to principles is reached, with Dryden, the idea of metrical proportion, decorum, or propriety is a standard of excellence; that idea lies behind the metrical pronouncements of Puttenham, Gascoigne, Sidney, Jonson, and Dryden, but the pronouncements of each of these critics should be studied in the light of their practice as poets. Within the period metrical decorum means, first of all, a certain appropriateness of stanza, measure, or metrical form to poetic kind, or to subject and audience; decorum is, further, a more general relationship between sound and sense; and it is, finally, the governing of individual lines by rule and convention.

Within the period there is general agreement that stress-verse is appropriate to the lowest style, but there is no permanent association of any metrical form with the high style. Puttenham and Gascoigne, along with one or two later critics, associate complexity of stanza with elevation of style, while for Jonson the heroic couplet is best suited to the high style. Dryden at one time attempted to associate musical form with lyric; the heroic couplet with epic, heroic drama, and satire; blank verse with high, and prose with low, comedy; but rigid decorum of this sort did not finally please him and

perhaps does not suit the genius of English poetry. Dryden could not bring himself to say that Milton's blank verse was appropriate to epic style, but the very existence of Shakespeare's late tragedies, *Paradise Lost*, and *All for Love* made it necessary for later critics to reckon with blank verse as a potentially elevated measure.

Within the period there is general agreement that the study of poetry is, on the one hand, the study of its meaning, and, on the other, the study of its sound. Before the Restoration the general view seems to be that sound and sense should be in the relation of manner to matter; or, in Sidney's language, in the relation of ornament and apparel to essence. But Dryden and other critics come close to describing a narrower relation between sound and sense, the doctrine of imitative sound, which Pope later gave most famous expression to.

All five critics believe, finally, that the individual English line must be governed by decorous rule; but a regular line at the beginning of the period is different from a regular line at the end of the period, and variations which seem either casual or absent at the beginning of the period later become both deliberate and common. As critics Puttenham and Gascoigne are able to describe the syllabic stress norm, but not the variations; Sidney, Jonson, and Dryden seem able to describe both norm and variations. As a poet Puttenham seems to observe only syllabic decorum, while Gascoigne as a poet contributes to a re-establishment not only of the norm of syllabic stress verse but also of at least one of the Chaucerian variations—initial stress-shift. In Sidney's verse there are artful and deliberate stress-shifts after pause, semisyllables after accented syllables, and diphthongs between words in the unstressed places of the line. Jonson extends the variations to include stress-shift by attraction, diphthongs between words and semisyllables anywhere in the line, articles in stressed places, and dramatic extra syllable. Dryden's practice in permitting semisyllables and diphthongs between words resembles Sidney's rather than Jonson's. And Dryden, Jonson, and Sidney are capable of rhetorical or poetic stress, which is not part of the metrical convention of a period.

248 pages. \$3.10. MicA54-1582

THE LITERARY CRITICISM OF  
ORESTES BROWNSON

(Publication No. 8321)

Charles Carroll Hollis, Ph. D.  
University of Michigan, 1954

Brownson's criticism is important for two reasons, each relating to a separate period in his life. In his liberal period, from 1838 to 1844, the critical reviews of the *Boston Quarterly* are those of a major Jacksonian literary critic as well as a significant interpreter and critic of New England transcendentalism. In the second and longer conservative period, from 1844 to the termination of *Brownson's Quarterly Review* in 1875, he was the first Catholic literary



critic of the age. This study examines both periods: Part I presents the criticism of the liberal period; Part II, the conservative period. For each part an introduction is given explaining his relationship and response to the cultural movements to which he gave challenging allegiance.

All of Brownson's literary criticism appeared first in periodical articles, many of which have not been collected. Accordingly, throughout the thesis, reference and quotation from periodical sources, now extremely difficult to obtain, has been the practice. For both parts significant material has been quoted in expanded footnotes, which thus provide a source for hitherto almost inaccessible material.

In Part I, the first chapter presents Brownson's theory of art and his critical standards. His concept of literature is essentially that of the transcendental group to which he belonged, but, unlike most members, he was passionately convinced that literature could be interpreted in terms of social forces of the age. In critical practice he gave equal attention to books of social significance, as Cooper's *American Democrat*, Bulwer-Lytton's novels, and Carlyle's *Chartism*, and to topics of philosophic interest, as Locke's influence on American thought, Wordsworth's poetry, and Emerson's Divinity School Address. The critical articles assume added significance when seen in terms of the rise and decline of romantic liberalism, in both theology and politics, which shaped so many of his literary judgments. Accordingly, the criticism of this first period is presented chronologically.

In Part II, the opening chapter discusses Brownson's formulation of a Thomistic aesthetics, a task in which he was definitely a pioneer in American thought. The critical standards he established were applied to so many works that only a representation of his criticism was feasible. Accordingly, a chapter is devoted to his criticism of certain literary and cultural problems to indicate the extent and quality of his critical investigation. The last chapter provides some specific examples of his Catholic criticism. For this, six writers were chosen: three novelists (Reade, Cooper, and Hawthorne) and three poets (Woodsworth, Lowell, and Emerson).

The conclusion makes no claim for Brownson as a forgotten giant of American literary criticism, but it does affirm his double importance as the only transcendental-Jacksonian critic that we have and the only Catholic critic of major stature in our literary history. 482 pages. \$6.03. MicA54-1583

AN ESSAY ON JOHN DENNIS'S THEORY AND PRACTICE OF THE ART OF TRAGEDY TOGETHER WITH THE TEXT OF HIS TRAGEDY OF *APPIUS AND VIRGINIA*

(Publication No. 8249)

Arthur Norman Wilkins, Ph. D.  
Washington University, 1953

Chairman: Donald C. Bryant

John Dennis (1657-1734), who wrote extensively about literary theory, has been recognized as a critic of importance in the early eighteenth century. Comparatively little attention has been paid, however, to his literary works and to their relationship to his critical theories. This dissertation, therefore, is a study of one play, *Appius and Virginia*, to determine to what extent it is an exemplification of Dennis's theory of tragedy. Besides presenting an edited text of the play upon which this study is based, together with the appropriate explanatory notes and a treatment of the textual problems which arise in editing the play, the essay discusses the sources from which Dennis drew the tragedy, his theory of tragedy as he presented it in his critical works, the particular application of this theory in *Appius and Virginia*, the reputation which the play has enjoyed since its first performance, and, finally, the merits of the tragedy as a work of art.

Tragedy for Dennis was a didactic rather than a mimetic art, for, he argued, if it is not to be an "empty amusement," tragedy must inculcate a moral by strictly observing poetic justice, that is, by punishing the evil characters and by rewarding the good. So that the instruction will be effective, however, the poet must also please his audience by observing the unities of action, time, and place. Furthermore, if the poet is working with an historical theme, as Dennis is in this play, the members of his audience who are familiar with the story, will expect the characters and events of the play to correspond closely to the actual historical events. The playwright, Dennis says, must not disappoint them. But since his purpose is to present universal rather than particular truths, he must not allow historical fact to prevent him from proving his moral or preserving the unities.

In some ways *Appius and Virginia* is well adapted to his purposes, for it shows the punishment of a wicked man, Appius. The death of Virginia, however, seems to be a violation of Dennis's notion of poetic justice. Except for this instance, Dennis has managed to use the historical material which he drew from Livy and Dionysius of Halicarnassus in such a way that one receives the impression that Dennis is following history closely. In fact, he has revised history at will to preserve the unities.

Most of Dennis's contemporaries considered *Appius and Virginia* a dull play, and most of the persons who have since read the tragedy have agreed. The plot of the play is indeed seriously defective. The characters seem unduly artificial, and even when, on occasion, they obtain from the reader a willing suspension of disbelief, they are by no means

everywhere consistent in their actions. Finally, the diction of the play seems unnaturally inflated. Since Dennis's play shares most of the faults and few of the virtues of the neoclassical tragedy of the reign of Queen Anne, one must agree with the critics who have called the play dull.

275 pages. \$3.44. MicA54-1584

## LANGUAGE AND LITERATURE, LINGUISTICS

### THE RELATION OF LATIN TO OSCAN-UMBRIAN

(Publication No. 8251)

William Greenwald Diver, Ph.D.  
Columbia University, 1953

In the early part of the nineteenth century - when for the first time attempts to decipher the Oscan and Umbrian inscriptions were put on a scientific basis - the theories that were advanced to explain the relationship between Oscan, Umbrian, and Latin were based primarily on the traditional histories of Rome, as set forth by such ancient historians as Dionysius of Halicarnassus. As linguistic science progressed and knowledge of the Indo-European languages increased, the classification on historical principles was replaced by one on linguistic principles, and in the second half of the century it was generally agreed that Latin, Oscan, and Umbrian were members of the Italic branch of the Indo-European family of languages.

The early twentieth century saw attacks, begun by Alois Walde and continued by Giacomo Devoto, brought against the classification of these languages as members of an Italic group. These scholars, supported by others, maintained that the differences between Latin and Oscan-Umbrian are very ancient, and that the similarities are recent, resulting from the co-existence of the languages in the Italian peninsula; and that therefore these languages do not share a particularly close genetic relationship.

The opinions of linguistic scholars on this problem may be divided roughly into two camps: 1) those that agree to a greater or lesser extent with the thesis of Devoto that Latin and Oscan-Umbrian are not dialects of a single earlier language; 2) those that support the older view, most extensively championed by Antoine Meillet, that these languages are the derivatives of an Italic branch of Indo-European.

A solution of the linguistic problem thus posed demands an analysis of all the points of difference and similarity between Latin and Oscan-Umbrian. The immediate purposes of the analysis are: 1) to determine whether the differences between Latin and Oscan-Umbrian are very old and represent differences of Indo-European date or are recent developments; 2) to determine whether the similarities between Latin and Oscan-Umbrian represent innovations of a common Italic period or are the result of

linguistic convergence due to geographical contiguity in the Italian peninsula.

An examination of both the linguistic and the archaeological evidence indicates that there are no isoglosses of Indo-European date dividing Latin from Oscan-Umbrian, that there was more linguistic divergence than convergence in Italy, and that, therefore, the position of Meillet - that Latin and Oscan-Umbrian are diverging dialects of an earlier language - is essentially sound.

It is thought that a new theory can be proposed to explain the distribution of similarities and differences among the Italic languages, taking into account not only Latin, Oscan, and Umbrian, but Venetic and Faliscan as well. This theory suggests a chronological development in three stages. Stage I is a period of Italic unity, existing before about 1200 B.C. Stage II extends to about 700 B.C., and during this period the speakers of Italic are spread out over an area extending from the head of the Adriatic to Rome; independent linguistic innovations cause differences to arise in each section of this area, the most noticeable innovations being those of Oscan-Umbrian, in the center, which contrast with archaic survivals in Venetic to the north and Latin-Faliscan to the south. Stage III is marked by the migration of part of the central group to the southern half of the peninsula. This group, who become the Oscan-speakers, are thus isolated and form one of the four divisions of Stage III, the others being Venetic in the north, Umbrian-Faliscan in the center, and Latin in the neighborhood of Rome. During this period, which lasts until Latin is spread throughout the peninsula, each division has its own innovations, the most striking being those of Umbrian-Faliscan, a very few of which are shared with Latin.

199 pages. \$2.49. MicA54-1585

### THE PHONEMIC PATTERNING OF THE INITIAL AND FINAL CONSONANT CLUSTERS OF ENGLISH FROM LATE OLD ENGLISH TO THE PRESENT: A STRUCTURAL APPROACH TO THEIR HISTORICAL DEVELOPMENT

(Publication No. 8313)

David Payne Harris, Ph.D.  
University of Michigan, 1954

The purpose of this study is to apply the techniques of structural linguistics to the investigation of the historical development of the initial and final consonant clusters of English, in order to arrive at answers to such questions as the following: how did the phonological structure of the late Old English cluster system differ from that of present-day English; which cluster types have shown the greatest degree of stability during the history of the language; can the changes within the cluster system be organized into a relatively small number of phonological categories and were these changes concentrated within any narrow chronological period; were there conditions within the language which facilitated the introduction of new clusters from foreign sources.



In Chapter II a system of phonemic interpretation is settled upon and the initial and final consonant clusters of Old English and Modern English are established. These are then arranged phonologically and presented side by side in a series of charts.

In Chapters III and IV the changes within the cluster system are organized into general morphological and phonological categories, and primary and secondary sources are examined to establish the manner in which these changes were effected and the time at which they occurred. These findings are then summarized by means of a second series of charts in which the changes are organized chronologically by phonologically-similar categories.

In Chapter V the data are synthesized, the overall system and the changes which have occurred therein being described by means of a series of brief, general summarizations supported by a minimum of detail drawn from the preceding chapters.

From the detailed summary of Chapter V three general conclusions can be drawn.

First, the many changes which have occurred within the system of initial and final consonant clusters of English can be reduced to a relatively small number of phonological and morphological types, so that there are actually very few clusters which do not fall under one or another of a limited group of categories.

Second, the consonant clusters, both initial and final, that have been acquired since Old English (save those involving changes in the phonemic system) have tended to a remarkable degree to fill in existing phonological patterns, so that few new types have been created in the development of the modern cluster complex.

Third, the final cluster changes – though apparently not the initial cluster changes – have tended generally to fall within the narrow chronological range of the fourteenth, fifteenth, and sixteenth centuries, the most crucial period consisting of just the first two of these centuries.

268 pages. \$3.35. MicA54-1586

#### ENGLISH FUNCTION WORDS AND CONTENT WORDS: A QUANTITATIVE INVESTIGATION

(Publication No. 8231)

Ralph Dana Winter, Ph.D.  
Cornell University, 1953

A dichotomy of the English word classes has been suggested at various times. This study accepts the recent, detailed proposal made by Dr. Charles C. Fries in his *Structure of English*; it questions in passing the validity of his structural grounds for the dichotomy; and it examines at length his claim that the dichotomy is supported by certain quantitative measures.

Two comparatively short texts (4,000 words) equal in length, but very different in purpose, subject matter, style, and literary form, were chosen as

sources of data. The status of each word in these texts is determined, i.e., each word is classified either as a content word (our term for Fries' Classes I, II, III, IV) or as a function word. The measurements typical of the words of each half of the dichotomy are determined in each of the following dimensions: 1) length of a word in segmental phonemes, 2) number of words intervening before the next occurrence of the same word, 3) average interval between successive occurrences of a word (reciprocal of relative frequency), and 4) sum of the squares of the intervals between successive occurrences of a word (a function thought to be sensitive to a clumping of the textual occurrences of a word).

Frequency distributions of the content words and the function words are plotted for each of these dimensions singly. Joint distributions are also plotted for numbers one and two, one and three, one and four, three and four, and one, three and four. Words in a text possess all four of these dimensions; the words in a list of the different words in a text possess only the first, the third, and the fourth.

Two questions then arise. The first is, "To what extent do the content words overlap the quantitative regions typical to the function words, and vice versa?" The answer is given, in part, by the following type of statement: "If one knows only the length and text frequency of a word drawn at random from either text, he can name the status of that word correctly with a probability of being right 7 times out of 8."

The second question is, "If the words are not segregated according to status for separate plotting, but are plotted as a single frequency distribution, is there any break in the curve, or a hint of any kind as to the possible existence of two groups of words distinguished from one another by a basic quantitative difference?" The answer to this question is more a matter of observation than of calculation. For example, the second dimension listed above clearly gathers the words of each text at opposite ends of the scale. The joint distribution of dimensions one and two creates in both texts two clearly discernible mounds dominated respectively by content words and function words.

In examining the words of each status as grouped in their classes, two dimensions are added (class size and class text frequency) but the same general questions are asked.

The first question above is answered by plotting the average values for whole classes. This gathers the content-word classes and the function-word classes fairly well at opposite ends of the scale in almost all the dimensions. In two dimensions (class size and one other associated with relative frequency) there is no overlap at all in the intermediate region of the scale.

For word classes, the second question above takes the form, "Would a consideration of the class-average data plotted in one dimension lead a person without a knowledge of the identity of the classes to propose the dichotomy on those grounds alone?" The answer is affirmative for the distributions of one or two single dimensions: class size, and perhaps word length. The same question for joint distributions of

two dimensions is answered positively for both texts at least where word length is coupled with class size or class text frequency.

The data of this study thus show that there are general quantitative differences which correspond to the distinction which the dichotomy makes for words and for word classes. The status of a word chosen at random from one of the two texts studied can be named, on the basis of quantities related to that word, with a fairly high degree of probability.

Furthermore, a person who 1) starts with the definition of the word classes and 2) considers the

size of a class to be of primary importance, would readily arrive at the dichotomy of classes on the basis of the quantitative data presented in this study.

In spite of great differences between the two texts, they are, in relation to the dichotomy, quantitatively very similar. One may reasonably suspect that these data have some general validity for texts of comparable length. For longer texts, some of the criteria used in this study might not suggest the dichotomy as strongly; it is possible that at least one would do so more effectively.

341 pages. \$4.26. MicA54-1587

## LIBRARY SCIENCE

THE UNIVERSITY OF MICHIGAN GENERAL  
LIBRARY: A HISTORY OF ITS  
BEGINNINGS, 1837-1852

(Publication No. 8274)

Russell Eugene Bidlack, Ph.D.  
University of Michigan, 1954

The purpose of this study is to trace in a detailed fashion the founding and early history of the University of Michigan General Library. Little has been written about American university libraries founded during the first half of the nineteenth century. That they played an insignificant role in the curriculum, were small and inaccessible, that they lacked adequate financial support and were poorly administered, are characteristics generally ascribed to them. How their initial book stock was acquired and into what subject divisions it fell, how the books were classified and cataloged, where they were housed and who controlled book selection - these are some of the questions for which answers are not readily available. In tracing the early history of one of those libraries it is believed that a step has been taken toward answering these questions, for it is evident that during its infancy the University of Michigan Library was typical of other college libraries in the United States. In a few ways it was unique.

The study begins with a discussion of the erroneous tradition that the old University of Michigan in Detroit (1817-1837) had a library, although twelve volumes once owned by that school are identified. The real history of the Library begins with the founding of the present University in 1837 and the appointment of Henry Colclazer, a local clergyman, as librarian. The first accessions were 242

volumes of government documents shipped from Washington in June, 1837. The Regents displayed an early interest in the Library when they purchased Audubon's *Birds of America* for \$970 in 1838, as well as Rafn's *Antiquitates Americanae*. In the same year they arranged for Asa Gray to purchase \$5,000 worth of books in Europe. Gray accomplished this largely through George P. Putnam, then in London, and 3,401 volumes were thus acquired. A catalog of this collection constitutes Appendix A. The first general catalog of the Library was prepared by George Coraelius in 1840 and was published as a document of the Michigan Legislature.

Particular attention is devoted to the early gifts to the Library, while regulations, housing, and use also receive detailed treatment. Two private collections were purchased by the Regents before 1852, the Matthew Meigs classical library (99 volumes) in 1844 and the Douglass Houghton scientific collection (258 volumes) in 1848. Catalogs of these two collections form Appendices B and C.

In 1845 the Regents decided to place the Library under the charge of Professor George P. Williams, and Colclazer was removed as librarian. Chapter X is devoted to William's administration (1845-1848) with particular attention to his classification of the Library, according to an adaptation of Jefferson's scheme, and to the printed catalog issued in 1846. The final chapter covers the period 1848-1852 during which time various professors were in charge of the Library and the first annual appropriation was made for its increase. With the coming of President Tappan in 1852, the Michigan Library passed out of its brief infancy into a prolonged period of adolescent growth and change.

663 pages. \$8.29. MicA54-1588



## MATHEMATICS

### AN ALGEBRAIC THEORY OF PROBABILITY WITH APPLICATION TO ANALYSIS AND MATHEMATICAL LOGIC

(Publication No. 8277)

Barron Brainerd, Ph.D.  
University of Michigan, 1954

The purpose of this thesis is to give a set of postulates sufficient for a theory of probability which would be algebraic in nature, and to postulate an integral which could be interpreted as conditional expectation as well as expectation.

To accomplish these results we axiomatize the concept of random variable very generally as a commutative ringoid with certain additional properties and define a certain linear mapping on a subset of this ringoid as the integral.

The most general postulate system proposed is also satisfied by the predicate calculus, where the integral turns out in one interpretation to be the existential quantifier and in another to be the universal quantifier. During the course of this part of the thesis, Birkhoff's seventy-third problem is solved for distributive lattices. Necessary and sufficient conditions are also given for certain ringoids to be isomorphic to ringoids of functions.

Following this work, the postulates for random variables are restricted somewhat, and it is shown that any system satisfying them is isomorphic to the algebra of complex measurable functions defined on a certain space with respect to a certain  $\sigma$ -algebra of subsets of the space. The integral too is restricted until it can be shown to induce on the above algebra of functions a conditional expectation.

Finally, the above results again are specialized so as to be an axiomatization of the concepts of measurable random process and stochastic integral.  
92 pages. \$1.15. MicA54-1589

### SOME ABELIAN SEMI-GROUPS OF LINEAR TRANSFORMATIONS OF HAUSDORFF TYPE

(Publication No. 8278)

George Ulrich Brauer, Ph.D.  
University of Michigan, 1954

The purpose of this study is to investigate certain methods of assigning generalized limits to divergent sequences. The methods considered here are represented by infinite matrices, that is they are transformations of the space of sequences into itself. If a matrix  $A$  transforms a sequence  $\{s_n\}$  into a sequence  $\{t_n\}$  which converges to some number  $\tau$ , then  $A$  is said to evaluate the sequence  $\{s_n\}$  to  $\tau$ . A matrix

which evaluates every convergent sequence to its limit is said to be regular.

An interesting class of matrices is the set of Hausdorff matrices, that is the set of matrices of

the form  $\rho \mu \rho^{-1}$ , where  $\mu$  is an arbitrary diagonal matrix and  $\rho$  is the Euler matrix which contains the coefficients of the binomial expansion of  $(1-x)^n$  in the  $n$ -th row. The best-known Hausdorff matrix is the Cesàro matrix of order one, which transforms every sequence  $\{s_n\}$  into the sequence which has the average of the first  $n$  elements of the sequence  $\{s_n\}$  as its  $n$ -th element. Many regular Hausdorff matrices evaluate a large class of divergent sequences.

A matrix which has the form  $A \mu A^{-1}$ , where  $\mu$  is an arbitrary diagonal matrix and  $A$  is a triangular matrix which has a reciprocal, will be called a matrix of Hausdorff type. The sequence of elements  $\{\mu_n\}$ , which appears on the main diagonal of  $\mu$ , will be said to generate the matrix  $A \mu A^{-1}$ . For a fixed matrix  $A$ , the matrices of Hausdorff type  $A \mu A^{-1}$  form a maximal abelian semi-group.

In Chapter I some preliminary theorems and examples are given. Some restrictions which must be placed on the sequence  $\{\mu_n\}$  in order that the matrix  $A \mu A^{-1}$  be regular are established.

In Chapter II the matrices of the form  $E_\alpha \mu E_\alpha^{-1}$  are studied,  $E_\alpha$  being the Hausdorff matrix generated by the sequence  $\{\alpha^n\}$  where  $\alpha$  is any complex number different from zero. If  $\alpha$  is equal to zero, the matrix  $E_\alpha^{-1}$  is undefined; however, if  $\alpha$  is set equal to zero in a certain expression which is obtained for the elements of  $E_\alpha \mu E_\alpha^{-1}$  when  $\alpha$  is not equal to zero, the resulting expression gives the elements of the Hausdorff matrix generated by the sequence  $\{\mu_n\}$ .

If  $\alpha$  is a positive number,  $E_\alpha \mu E_\alpha^{-1}$  is a regular matrix and  $\beta$  is a complex number such that the modulus of  $1-\beta$  is less than that of  $1-\alpha$ , then the matrix  $E_\beta \mu E_\beta^{-1}$  transforms every bounded sequence  $\{s_n\}$  into a sequence which differs from  $\{s_n\}$  by a null sequence. In particular, the matrix  $E_\beta \mu E_\beta^{-1}$  is regular, and it can be shown that it evaluates no divergent sequences. If the modulus of  $1-\alpha$  is greater than 1, then the only regular matrix  $E_\alpha \mu E_\alpha^{-1}$  is the identity matrix. It remains an open question whether there exists a regular matrix  $E_\alpha \mu E_\alpha^{-1}$  which evaluates some divergent sequences.

In Chapter III the matrices of the form  $C_m \mu C_m^{-1}$  are studied, where  $C_m$  is the Cesàro matrix of order  $m$ , that is the Hausdorff matrix generated by the sequence  $\{1/\binom{n+m}{n}\}$ . It is assumed that  $m$  is a non-negative integer. If the matrix  $C_m \mu C_m^{-1}$  transforms every bounded sequence into a bounded

sequence, then the matrix  $C_{m-1} \mu C_{m-1}^{-1}$  has the same property. The chief result of this chapter is that if  $m$  is an integer greater than one, then there exists no regular matrix  $C_m \mu C_m^{-1}$  which evaluates a divergent sequence. An example of a regular matrix  $C_1 \mu C_1^{-1}$  which evaluates a divergent sequence is given. 49 pages. \$1.00. MicA54-1590

# SOME CONNECTIONS BETWEEN OPERATORS IN HILBERT SPACE AND RANDOM FUNCTIONS OF SECOND ORDER

(Publication No. 8308)

Ronald Kay Getoor, Ph.D.  
University of Michigan, 1954

The main purpose of this paper is to generalize certain well-known properties of stationary random functions to more inclusive classes of random functions. In particular, the generalization of the harmonic analysis of stationary random functions has been the paramount goal. Such a study leads one to certain very natural generalizations of stationary random functions. Since only second order properties of random functions are considered in this study it is natural that the main tool used is the theory of operators in Hilbert space (the connection between random functions of second order and Hilbert space being well-known).

Section I deals with certain preliminary results concerning random functions of second order and in particular contains a definition of a general integral in Hilbert space. All integrals involving random functions which appear in later sections are special cases of this integral. The integral is very closely related to the Karhunen integral.

Section II characterizes a wide class of random functions of second order in terms of self-adjoint operators on an appropriate Hilbert space. The basic assumption for this characterization is that covariance function  $R(t, s)$  of the given random function  $x(t)$  have the form

$$R(t, s) = \int_{-\infty}^{\infty} \dots \int_{-\infty}^{\infty} f(t; \lambda_1, \dots, \lambda_n) f(s; \lambda_1, \dots, \lambda_n) d\alpha(\lambda_1, \dots, \lambda_n)$$

where  $\alpha$  is a bounded measure in  $E^n$  and the  $f(t; \lambda_1, \dots, \lambda_n)$ 's are subject only to the restriction that the integral in question exist. It is then shown that there exist  $n$  self-adjoint transformations  $A_1, \dots, A_n$ , densely defined on an appropriate Hilbert space such that

$$x(t) = f(t; A_1, \dots, A_n) x(0).$$

In Section III, a class of random functions of second order is defined whose translates are symmetric operators in the same manner that the translates of stationary functions are unitary operators. The general case in which these translates are unbounded is investigated and then the problem is specialized to the case of bounded operators. A necessary and

sufficient condition that a random function be symmetric (i. e., have symmetric translates) is that  $R(t, s) = r(t + s)$ . In the theory of symmetric random functions the Laplace transform plays a similar role to that played by the Fourier transform in the theory of stationary functions.

Finally in Section IV, random functions which have normal translates are studied. These generalize both stationary random functions and those studied in Section III. A harmonic analysis for such random functions is obtained and a mean ergodic theorem is proved.

Thus all properties of stationary random functions which depend only on the spectral resolution of the unitary operator and not on its isometry can be carried over to the random functions defined in Sections III and IV. 41 pages. \$1.00. MicA54-1591

# AN INVESTIGATION OF SOME PROPERTIES OF ASYMPTOTIC LINES ON SURFACES OF NEGATIVE GAUSSIAN CURVATURE

(Publication No. 8177)

Charles Stanley Ogilvy, Ph.D.  
Syracuse University, 1954

A region of a surface is given by a vector function  $\bar{x}(u, v)$  which depends continuously on the real parameters  $u, v$ , where  $u$  and  $v$  are the Cartesian coordinates of the two-dimensional Euclidean plane. At a point  $P$  of the surface represented by  $\bar{x}(u, v)$ , we consider all the curves on the surface passing through  $P$ . If the tangent vectors to all these curves at  $P$  exist and lie in one plane, then this plane will be called the tangent plane to the surface at  $P$ . If at every point of a region of the surface the tangent plane to the surface exists, then the region will be called regular. Furthermore, we assume the existence and continuity of derivatives up to any order whenever these are required in special situations.

The asymptotic lines on a regular region of a surface are those curves along which the normal curvature is zero. If the region has everywhere negative Gaussian curvature, there are two real distinct asymptotic lines through each point. It is with properties of these lines that this paper is concerned.

The coordinates of the surface are given in terms of the two real parameters  $(u, v)$ . If the parameter lines  $u = \text{const.}$  and  $v = \text{const.}$  are the asymptotic lines on the surface, we shall refer to the parametric net as an asymptotic parametrization. We obtain the differential equation of a family of trajectories cutting one set of asymptotic lines at a constant angle, under asymptotic parametrization. This equation is given in terms of the coefficients of the first fundamental quadratic form; it is essential to the development of the spherical mapping which follows.

We next prove a theorem stated but not proved by von Lilienthal, that the normal curvature of the orthogonal trajectory of either asymptotic line at a point is twice the mean curvature of the surface at that point. This theorem complements the theorem of



Beltrami-Enneper, inasmuch as together they show how the two fundamental invariants of a surface, the Gaussian curvature and the mean curvature, are determined by knowledge of the set of asymptotic lines.

We show next that no doubly ruled surface can be a minimal surface.

Finally we give a new representation of the mapping by parallel normals for a surface of negative Gaussian curvature: the mapping is replaced by a local mapping of the surface into itself which can be decomposed into three linear transformations. This procedure is based on our results concerning the behavior of the trajectories of the asymptotic lines. Let the surface of negative Gaussian curvature be parametrized so that the asymptotic lines form the parametric net. At an arbitrary point P of the surface we consider two arbitrary linearly independent

vectors in the tangent plane at P. Interpreting these two vectors as tangent vectors to the two trajectories of the asymptotic lines through P, we are able to show that the spherical mapping is equivalent to a local transformation of the tangent vectors at P which can be constructed of the following three linear transformations:

(1) A rotation through  $90^\circ$  in the tangent plane at P, such that the vector tangent to one of the asymptotic lines through P, say the positive U-axis, becomes a vector tangent to the positive U'-axis.

(2) A reflection in the tangent plane with respect to the direction of U'.

(3) A shear in the tangent plane leaving the direction of U' fixed and carrying the angle between the asymptotic lines into its supplement.

33 pages. \$1.00. MicA54-1592

## MINERALOGY

### GEOLOGY OF THE GUFFEY AREA, COLORADO

(Publication No. 8273)

James Edward Bever, Ph.D.  
University of Michigan, 1954

The region geologically mapped as the Guffey area lies within the southern Front Range adjacent to and to the south of South Park. The area is underlain chiefly by pre-Cambrian rocks covered to the east, north and west by Tertiary extrusives. Paleozoic sediments on the western, down-faulted block of the Chumway fault crop out in the area.

The pre-Cambrian rocks include the metamorphic rocks (schists, lime-silicate rocks, hornblende gneiss and biotite gneiss) and the granitic intrusives and associated units. Probably all the metamorphic rocks may be correlated with the Idaho Springs formation, the oldest exposed in the Front Range, but some may be Swandyke hornblende gneiss and quartz monzonite gneiss. Within this area it is concluded that all hornblende gneiss has been derived through metamorphism of dolomitic, chloritic shales. Elsewhere it may be of partially meta-igneous origin. Unusual cordierite-anthophyllite rocks were derived through the Fe-Mg metasomatism of impure lime-stones or dolomitic limestones. These are extremely similar to the famous occurrences at Orijärvi, Finland and Kenidjack, Cornwall, England. The Fe and Mg were supplied in part by material withdrawn from the metamorphic column. Widespread and intimate lit-par-lit injection of the Idaho Springs formation by the granitic intrusives formed the migmatitic portion of the biotite gneiss, whereas the paragneiss sections represent meta-arkoses. The granitic intrusives are affiliated almost exclusively with the Boulder Creek granite which is closely related to the Pikes Peak batholith, although a few may be Silver Plume granite affiliates. Associated with these intrusions are

pegmatite, gneissic aplite and possibly diabase sills and dikes.

Paleozoic sediments are exposed only in a relatively limited area in the west-central section. They are correlated with the Lower Pennsylvania Fountain formation, and are typically arkosic and conglomeratic.

Oligocene extrusive rocks are here named the Guffey volcanics with the upper section correlated with the Thirty-nine Mile andesite series, and the lower section here designated the Chumway rhyolite. They covered most of the area with flows and tuffs thousands of feet thick, but have been extensively removed by erosion following a Miocene-Pliocene uplift. Two volcanic breccia necks that served as feeders for the flow material and a monzonitic stock are present.

A very small area of post-extrusive sandstone crops out near the Rowe ranch west of Currant Creek, and two small recent travertine deposits occur on the Guffey road. Pleistocene and Recent sands and gravels are present in stream channels.

The major economic potentialities in the area lie in the pegmatite deposits. Some of these have been mined for mica, feldspar and beryl and by-product rare-element minerals. The detailed paragenesis of the Meyers Ranch pegmatite is described. Quartz-muscovite symplectites and quartz-magnetite symplectites, the latter at the Whopper pegmatite, have been found to be of exclusively replacement origin. Sillimanite is abundant but is not economic under existing price conditions. Complex copper ores and scheelite mineralization occur in metasomatic lime-silicate deposits. These have had very modest development as sub-marginal deposits in the past, but may be indicative of more significant yet undiscovered ore-bodies. Although the area has been extensively prospected for gold, there is little promise for production.

309 pages. \$3.86. MicA54-1593

## MUSIC

### THE TEACHING OF BOWED INSTRUMENTS FROM 1511 TO 1756

(Publication No. 8236)

Maurice Winton Riley, Ph. D.  
University of Michigan, 1954

The purpose of this study is to ascertain the history, materials, methods, and techniques of teaching the playing of bowed instruments between 1511 and 1756. These dates were chosen because the first known printed treatise containing such material (Sebastian Virdung's *Musica getutscht*) appeared in 1511; and because works printed since 1756 (the publication date of Leopold Mozart's *Versuch einer gründlichen violinschule*) have already been investigated.

In all, forty-four primary sources were examined: all available printed treatises containing instructions for playing members of the viol or violin families, music with appended instructive material, diaries, letters, and autobiographies. The information drawn from these sources is assigned to and analyzed in the first five chapters of the thesis, as follows: (1) works printed prior to 1556; (2) French treatises from 1556 to 1756; (3) English publications from 1606 to 1756; (4) German works from 1616 to 1756; and (5) Italian sources from 1600 to 1756. The information is summarized and evaluated in the sixth, or concluding chapter, under the following topics: equipment, tuning, notation, performance practices, the teacher and teaching, the student and practicing, and etudes and compositions for study.

Because of the multiplicity of types and sizes of viols, the writer of a manual usually furnished descriptive material, drawings, and advice concerning the instrument, strings and their tunings, frets, and tablature. These essentials were sometimes the only instructive material given, and particularly in several manuals primarily for lute, but supposedly adaptable for viols. Most of the viol and violin sources contain material on bowings, special fingerings, interpretation of rhythmic figures, and improvisation of variations and ornaments. The seventeenth and early eighteenth century treatises vary

considerably on the constitution and the interpretation of ornaments. Besides the trill, mordent, turn, and grace notes, which are considered ornaments today, the treatises examined include as ornaments: bowings, dynamics, harmonics, and the vibrato. The numerous embellishments were sometimes indicated by the composer, but more often improvised at the discretion of the performer. Performance became so profusely decorated that most of the later writers advise the use of restraint in ornamentation. Next to ornaments, the subjects of bowings and the vibrato are of the most interest. Bowing practices, which varied from country to country, are described and illustrated; the vibrato, originally an ornament, had apparently come into widespread use by the middle of the eighteenth century. Other subjects related to performance practices described in the documents are just intonation, the mute, pizzicato, double-stops, and accompanying. There is much important material related to the problems of pedagogy for the teacher and practice for the pupil. Finally, there is the music contained in the instructional works, much of which is scarcely known today, but which has certain features that make it worthy of study.

From the large amount of factual material found in the documents, three general conclusions were drawn: (1) Many "new" teaching techniques which are brought out today in reality have long since been tried and accepted or rejected. On the other hand, there are many valuable aids to bowed instrument pedagogy in these tutors which could help twentieth century teachers in their work. (2) A wealth of valuable string literature by seventeenth and eighteenth century masters, the basic study material used by teachers of the period, could be exploited today, as it was at that time, with profit. (3) Present day musicians would benefit, in their performance of string music written before 1756, by the information contained in the treatises. This source material indicates that perhaps a revision is needed in the attitudes held at the present time by performers and teachers concerning such subjects as the bowings, the vibrato, and the interpretation of printed rhythmic figures.

466 pages. \$5.83. MicA54-1594



## PHARMACOLOGY

### AN ANALYSIS OF THE CARDIOVASCULAR ACTIVITIES OF SELECTED PURINE DERIVATIVES WITH SPECIAL REFERENCE TO THE CONSTITUENT PARTS OF AMINOPHYLLINE

(Publication No. 8310)

Harold Francis Hardman, Ph.D.  
University of Michigan, 1954

The purpose of this problem was to examine the cardiovascular properties of selected purine derivatives as related to their chemical constitution. Special reference was made to the constituent parts of aminophylline (theophylline and ethylenediamine).

The isolated cat papillary muscle and dog heart-lung preparations were employed as test objects for evaluating the cardiovascular activities of the compounds examined.

The results obtained in Part I of this study demonstrate that modifications of the basic purine nucleus by appropriate substitutions produces compounds exhibiting a wide range of cardiovascular activities. Positive inotropic and positive chronotropic activity can be separated and modified individually in the purine molecule by selective alteration of its chemical structure.

Several examples are presented in which the pharmacological activity of chemicals commonly employed as solubilizing agents for purine derivatives greatly influence the activity of the solute.

An investigation of the reported cardiac activity of a recently introduced theophylline derivative, 7-diethylaminoethyltheophylline (R-3588), produced negative results. Neither the compound per se nor some of its potential products of hydrolysis exhibited significant cardiac activity as measured by my criteria.

A method has been described employing competence index to predict the approximate duration of action of a drug reversing cardiac failure in the dog heart-lung preparation.

In Part II of the study, the discovery that ethylenediamine possessed marked positive inotropic activity suggested a logical explanation for the apparent superiority of aminophylline over other theophylline salts in the treatment of congestive heart failure. Experiments are reported in which ethylenediamine is shown to enhance the action of theophylline in reversing cardiac failure in the dog heart-lung preparation.

The hypotensive response resulting from rapid intravenous injection of aminophylline in the dog is largely due to the ethylenediamine present in this drug. The site of the ethylenediamine hypotensive action has been shown to be cephalad to the anatomical junction of the internal carotid and vertebral arteries. The mechanism of drug action responsible for the fall in blood pressure is apparently related

to the chelate structure of ethylenediamine. The nature of the substance being chelated has not been determined, however, calcium ions have been tentatively implicated.

The general conclusions drawn from this study are that the purine molecule provides an excellent tool for further investigation of the basic mechanisms involved in positive inotropic and positive chronotropic activity in mammalian cardiac muscle. The amino substituted purine derivative, 2,6-diaminopurine sulfate, is of great interest and appears to be superior to the classical methylated xanthines as a cardiac stimulant.

Ethylenediamine can no longer be considered as a pharmacologically inactive solubilizing agent for theophylline in the commercial preparation aminophylline. Ethylenediamine contributes to the positive inotropic activity of aminophylline and to its duration of action. The hypotensive activity of ethylenediamine is apparently related to the chelate structure of the molecule which acts upon a receptor substance located within the cranial boundaries of the dog's nervous system. 108 pages. \$1.35. MicA54-1595

### STUDIES ON THE SITES OF METABOLISM, DISTRIBUTION AND TOLERANCE DEVELOPMENT TO CERTAIN THIOBARBITURATES

(Publication No. 8324)

Annetta Rosaline Kelly, Ph.D.  
University of Michigan, 1954

Prior to this study, disagreement existed in the literature concerning the site of detoxication of thiopental. The purpose of this investigation was to evaluate the role of the liver in the metabolism of thiopental and three other thiobarbiturates - viz., Surital, Thioethamyl and B-10 (5-isopropyl-5-[2-methylpentenyl-2]-2-thiobarbituric acid). Since knowledge was lacking concerning the plasma and tissue distribution of these compounds, as well as tolerance development and potentiation, these subjects were also investigated.

In Part I, data obtained by the following methods (five *in vivo* and one *in vitro*) definitely implicate the liver as a major metabolic site for these thiobarbiturates in man and three animal species: (1) Production of liver dysfunction in the mouse by use of an hepatotoxic agent; (2) reduction of the amount of functioning liver tissue in the rat by subtotal hepatectomy; (3) reduction of blood flow through the liver by production of an Eck fistula in the rat and dog; (4) comparison in patients with normal and decreased hepatic function; (5) comparison of rates of disappearance from plasma in the dog heart-lung, heart-

lung-kidney preparation; and (6) *in vitro* degradation of the drug by rat liver tissue. Significantly increased durations of action of the thiobarbiturates were demonstrated with liver dysfunction produced by methods (1-4) above. Eck fistula dogs (3), in addition, showed elevated plasma levels and slower rates of removal from plasma than normal. Disappearance rates of thiopental from plasma in the intact animal, dog heart-lung, heart-lung-kidney, and heart-lung-liver preparation (5) were 12.6, 1.2, 6.2 and 15.2 per cent per hour, respectively. *In vitro* degradation (6) of thiopental by rat liver slices and mince was demonstrated.

Part II deals with plasma and tissue distributions of the four thiobarbiturates. Plasma time-concentration curves and anesthetic durations were obtained in dogs following single equimolar doses of the thiobarbiturates and, despite differences in side-chain structure and durations of action, they were observed to disappear at identical rates. As the anesthetic duration (potency) increased, the plasma level at the point of recovery declined. Potency ratings, calculated for the thiobarbiturates by both of these criteria, were compared.

Plasma disappearance curves for various doses of thiopental were parallel, but plasma levels at recovery increased with dosage.

Concentrations of thiopental in mouse plasma, liver and kidney were determined at intervals following intravenous injection. Ratios of liver and kidney concentrations to that of the blood indicated

that equilibrium occurred within one minute after injection of the drug, the liver containing a concentration almost four times that of blood and the kidney twice.

Part III is devoted to tolerance development and potentiation in relation to thiopental. Acute tolerance to the depressant action of the drug was demonstrated in the dog. After a large dose of thiopental, the plasma level of the anesthetic at awakening was found to be significantly higher than after a small dose. After several small doses (each administered after apparent recovery from the last) increasing durations of action were obtained, and plasma levels at awakening increased with each succeeding dose.

Administration of a single daily 20 mg./kg. dose for seven days showed no evidence of tolerance or cumulation in the dog. Two doses of this size per day demonstrated marked cumulation, but also recovery at significantly higher plasma levels. Development of central respiratory tolerance with this latter dose was investigated but could not be demonstrated.

A large number of malonic and thiobarbituric acid derivatives, which were theoretically possible thiobarbiturate degradation products, were screened for ability to potentiate these thiobarbiturates. Thiourea and thiobarbituric acid were each found to potentiate thiopental but only in amounts too large to be possible degradation products.

108 pages. \$1.35. MicA54-1596

## PHILOSOPHY

### THEMATIC VALUES AND UNIVERSAL NORMS

(Publication No. 8239)

Paul Kindred Deats, Jr., Ph.D.  
Boston University School of Theology, 1954

For abstract see *Anthropology*, Vol. XIV, No. 7, page 1013. 256 pages. \$3.20. MicA54-LC-1486

### THE THEORY OF LOVE IN THE PHILOSOPHY OF ST. THOMAS AQUINAS

(Publication No. 8087)

William L. Rossner, S. J., Ph.D.  
Princeton University, 1953

The problem of this thesis is to discover how the philosophy of St. Thomas Aquinas conceives the nature of love.

The method is a survey of the various kinds and facets of love. The more important texts are analysed, discussed, and synthesized. Various conclusions emerge which present his thought as more dynamic than usual interpretations suggest, particularly regarding local motion and the concept of being.

The fundamental characteristic discovered in the analogous manifestations of love is that of inclination to another. This term of the inclination is always similar and suitable somehow to the lover, a good, and an end. Love is the source of all activity and motion, which is always towards a beloved end.

Love divides intrinsically into an inclination to get something and an inclination to give (called respectively love of concupiscence and of friendship). Love simply speaking is love of friendship, which is an inclination to the good in and for itself, a generous appetitive resonance. Love of concupiscence is this love as qualified, an inclination to a good as for another, usually the self.

Three general classes of loves are clearly distinguished: sense and intellectual, inclinations to goods as known by sense or intellect; and natural, an inclination to its good in being itself.

Sense love has two elements: The material element is bodily change; and the formal element is the first immanent operation of the sense appetite, an inclination towards the sensibly agreeable. The formal element manifests two phases, passion and action, a passive being attracted by the good as known by sense, and the active drive towards it.



Intellectual love is the complacency of the intellectual appetite, or will, in something known as good by intellect. This knowledge is merely a condition, though intrinsically necessary, for the actual attraction of the good, which is sole proper cause of love. This causality of the good, which is final causality of end, is the passive phase, intellectual love as passion: The will is drawn to the good in both specification and exercise. The second phase is the first operation of will.

Natural love is the tendency of being itself, present in all reality from pure potency up to God. One of the effects of natural love is local motion, which is here given a new interpretation not irreconcilable with modern mathematical physics.

The supreme application in reality is Divine Love. Just as in knowledge there is an esse superior to merely entitative esse, a superexistence by mode of immaterial identity, so in love there is an esse superior to merely entitative esse (and to the superexistence of knowledge), a superexistence by mode of gift, an esse of superabundance.

The supreme application in knowledge is the transcendental concept of love. At most seven such transcendental concepts have been recognized: being, thing, something, one, true, good, beautiful. Since none of them express the dynamism or tendency in being, it is argued that love is a new transcendental, which says "being as inclined to something."

Various interpretations of St. Thomas and pertinent philosophical positions are confronted with the concepts evolved here and in their perspective criticized. Some of the principal ones: the interpretation of Thomism as static and intellectualist as opposed to more dynamic philosophies; the concept of love as a self-centered "eros" naturally opposed to unselfish charity or "agape;" identification of good and subjective tendency. It is suggested that a way for reconciliation of traditional philosophy of being with modern positions may be offered in the view of being as dynamic, expressed in the transcendental concept of love.

377 pages. \$4.71. MicA54-1597

## PHYSICS

### PHYSICS, GENERAL

#### ON THE THEORY OF IRREVERSIBILITY

(Publication No. 7792)

Thomas A. Kaplan, Ph.D.  
University of Pennsylvania, 1954

Supervisor: Dr. Herbert Callen

A detailed study of the various theories of irreversibility is made in an attempt to discover their interrelationships and thereby combine them into a single, unified theory of irreversibility.

The theories of Onsager and Callen-Greene are extended and the two extended theories are shown to be completely equivalent. It is further found that, with certain limitations, the theory presented by Callen in his Thesis is a rigorous quantum mechanical derivation of the Onsager theory. Although the problem of determining the relation between the theory of Callen-Welton (and Callen-Barasch-Jackson) and the three above-mentioned theories has not been solved, it is discussed in detail, some of the difficulties therein being indicated.

The field of statistical mechanics, basic to all theories of irreversibility, is reviewed. In particular, the assumption of random phases, The Principle of Microscopic Reversibility, and certain problems relating to thermodynamic fluctuation theory are critically discussed.

92 pages. \$1.15. MicA54-1598

### PHYSICS, NUCLEAR

#### THE QUADRATIC POTENTIAL CONSTANTS OF THE METHYL HALIDES

(Publication No. 8284)

Tsu-shen Chang, Ph.D.  
University of Michigan, 1954

A complete set of the twelve quadratic potential constants required by the symmetry of the methyl halide molecule, has been determined for  $\text{CH}_3\text{Cl}$ . These constants were initially expressed as the coefficients of the quadratic combinations of the symmetry coordinates but were later converted into the form more appropriate for a molecule whose potential is dominantly of the valence type. The determination makes use of the experimental data on the fundamentals, the zetas of the light and the heavy isotopes of  $\text{CH}_3\text{Cl}$ , as well of the centrifugal stretching constants  $D_{JK}$  of  $\text{CH}_3\text{Cl}^{35}$  and  $\text{CH}_3\text{Cl}^{37}$ . The agreement between the calculated  $D_{JJ}$  for  $\text{CH}_3\text{Cl}^{35}$  and the recently-obtained experimental value serves as an independent check on the work.

Due to insufficient data for the rest of the methyl halides ( $\text{CH}_3\text{F}$ ,  $\text{CH}_3\text{Br}$  and  $\text{CH}_3\text{I}$ ), only seven valence force constants have been determined for those molecules. Reasons are given for believing that the remaining five constants are small and, to this approximation, are not significant. The evaluations of the seven force constants were made possible partly through the aid of the results on  $\text{CH}_3\text{Cl}$  and partly through the use of the observed fundamentals of the molecule in question. As a confirmation of the

potential constants of  $\text{CH}_3\text{F}$ , independent checks have been made with the experimental values of the fine structure spacings and the centrifugal stretching constants  $D_{JJ}$  and  $D_{JK}$ . In the case of  $\text{CH}_3\text{Br}$  or  $\text{CH}_3\text{I}$ , their respective potential constants have been tested by experimental checks on such calculated quantities as the normal frequencies of  $\text{CD}_3\text{Br}$  or  $\text{CD}_3\text{I}$ , the fine structure spacings and the centrifugal stretching constants  $D_{JJ}$  and  $D_{JK}$  of  $\text{CH}_3\text{Br}$  or  $\text{CH}_3\text{I}$ . The agreements appear to be quite good in all cases, except perhaps for the centrifugal stretching constant  $D_{JJ}$  of  $\text{CH}_3\text{I}$ .

In all of the above determinations of the potential constants, the normal frequencies have been estimated from the observed fundamentals by correcting for their anharmonicities and for Fermi resonance if any.

The numerical results of the force constants shown below indicate that the relative magnitudes of the constants for each member of the methyl halide series are consistent and that the forces are mainly of the valence type except perhaps those binding the halide atom to the methyl group. The most significant interaction force is the one which couples the C-X stretching and  $\angle\text{H-C-X}$  bending.

(All force constants in units of  $10^5$  dynes/cm)

	$\text{CH}_3\text{F}$	$\text{CH}_3\text{Cl}$	$\text{CH}_3\text{Br}$	$\text{CH}_3\text{I}$
$k_1$	$5.360 \pm .06$	$5.543 \pm .06$	$5.523 \pm .06$	$5.550 \pm .05$
$k_2$	$5.727 \pm .05$	$3.425 \pm .05$	$2.889 \pm .05$	$2.313 \pm .02$
$k_3$	$0.484 \pm .005$	$0.517 \pm .005$	$0.500 \pm .005$	$0.505 \pm .005$
$k_4$	$0.857 \pm .007$	$0.653 \pm .007$	$0.645 \pm .007$	$0.582 \pm .005$
$k_5$	--	$-0.03 \pm .3$	--	--
$k_6$	--	$-0.05 \pm .03$	--	--
$k_7$	$0.573 \pm .03$	$0.320 \pm .03$	$0.305 \pm .03$	$0.234 \pm .02$
$k_8$	--	$-0.08 \pm .03$	--	--
$k_9$	--	$0.13 \pm .1$	--	--
$k_{10}$	--	$-0.008 \pm .1$	--	--
$k_{11}$	$-0.020 \pm .005$	$0.010 \pm .005$	$0.040 \pm .005$	$0.051 \pm .003$
$k_{12}$	$0.020 \pm .005$	$0.070 \pm .005$	$0.104 \pm .005$	$0.156 \pm .003$

A method for adjusting the force constants as well as for finding their uncertainties has been developed, which proves as useful as it is simple. Its distinctive use is shown by the variation table of  $\text{CH}_3\text{Cl}$  built from this method, which helps substantially in the evaluation of the potential constants of the remaining methyl halides.

With the hope that future experimental work on the vibration bands of the partially-deuterized methyl halides may add information for improving the accuracy of the potential constants obtained above, a theoretical formulation for finding the normal frequencies has been worked out. The normal frequencies have been calculated numerically for  $\text{CH}_2\text{DI}$  and  $\text{CHD}_2\text{I}$ . The results are, in units of  $\text{cm}^{-1}$ :

<u>Odd Type</u>	CH <sub>2</sub> DI	3182	1225	716			
	CHD <sub>2</sub> I	2388	1302	612			
<u>Even Type</u>	CH <sub>2</sub> DI	2787	1176	517	3200	1217	720
	CHD <sub>2</sub> I	2613	1189	505	2425	1227	777

131 pages. \$1.64. MicA54-1599

## THE LATERAL STRUCTURE OF LARGE AIR SHOWERS AT HIGH ALTITUDE

(Publication No. 8292)

William Potter Davis, Jr., Ph. D.  
University of Michigan, 1954

A large ionization chamber, equipped with eighteen parallel collecting wires, together with two smaller cylindrical ionization chambers placed on either side of the main chamber, has been used to study the lateral structure of air showers at an altitude of 3260 meters. The main chamber wires were 47 cm. in length and were separated by 10 cm., while the side chambers had an effective area of 0.178 meter<sup>2</sup>. Therefore, any structure within about two meters of the shower core, as well as the location of the core itself, could be observed. The ionization chamber pulses were recorded photographically from a synchroscope which utilized twenty cathode ray tubes. A movable Po- $\alpha$  source was used to test the purified argon filling agent for the lack of electron attachment.

An assumed lateral electron distribution corrected for the 1.05" dural top of the main chamber is used for analyzing the observed response of the eighteen channels of the main chamber. Using events in which a flat electron distribution over the length of the main chamber was observed, the different transition effect in the side ionization chambers is determined experimentally.

The fluctuations in the lateral spread of a single shower having a large number of particles are investigated, in order to compare these response curves with the experimental data, with the result that the fluctuations were found to be  $1.15 \sqrt{N_i}$  where  $N_i$  is the number of electrons per wire  $i$ .

Of the 9000 events recorded, approximately 100 were analyzed in detail, either because their cores passed near enough the main chamber for analysis of the core structure, or because their cores passed far enough away for analysis of the transition effect. Thirty-seven of these are shown, some showing a single cascade peak and others showing evidences of multiple core structure.

The conclusions resulting from the comparison of theory with experiment show that

1) some single electronic cascade showers show lateral electron distributions which are steeper than the Moliere distribution for the shower maximum, indicating that at 3260 meters altitude some very "young" showers can be observed.

2) over 80% of the showers observed were adequately described by the corrected Moliere lateral distribution, a fact substantiated by the randomness of the spatial distribution of core hits, as well as the observation of the side ionization chamber responses.

3) the soft component of a large air shower is usually due to one high energy shower, or to showers with axes separated by less than 20 cm., which in some cases has accompanying auxiliary showers having energies lower by a factor of from 3 to 5.

4) some showers show multiple maxima separated from each other by about one meter and of



approximately the same height, probably caused by either multiple  $\pi^0$ -meson production in the first nuclear collision, or contributions from later nuclear collisions of the N-component associated with the soft component.

5) the absolute shower rate for showers where  $10^5 < \pi < 10^6$  is consistent with the latest results of Williams, if the transition effect correction is lowered from about a factor two to about a factor 1.5.

6) the transition effect near the shower core for iron is approximately 25% greater than that for the same thickness in radiation lengths of aluminum.

7) two individual photon shower cores from a single  $\pi^0$ -decay cannot be resolved, unless apparatus with higher resolving power is used, although it may be inherently impossible regardless of resolution, because of the statistical fluctuations involved.

8) some showers exhibit a flat lateral electron distribution over a region of greater than two meters, which may be attributable to multiple cores.

132 pages. \$1.65. MicA54-1600

## POLITICAL SCIENCE

### POLITICAL SCIENCE, GENERAL

#### THE RELATIONSHIP BETWEEN POLITICAL PARTICIPATION AND SOCIO-POLITICAL INTEGRATION IN THE DETROIT METROPOLITAN AREA

(Publication No. 8269)

Sidney Belanoff, Ph. D.  
University of Michigan, 1954

This study is an investigation of the relationship between the individual's integration with his society and his political participation. Recent commentary by several writers in the social sciences has pointed to the complexity and bewildering nature of contemporary society. The result, these writers state, has been the estrangement of the individual from the community, its institutions and its groups. One manifestation of this estrangement is a decline in political participation. The importance of the relationship between integration and political participation is made clear when it is considered that democratic institutions are assumed to rest upon widespread popular approval and participation.

Facilities for conducting the study were provided by the Detroit Area Study. Interviews were conducted with 749 respondents in metropolitan Detroit. These respondents were a representative sample of the Detroit area.

Several indices of integration with the community were examined in their relation to political participation. In general there was a positive relationship between community integration and political participation. Home ownership, length of residence, formal group membership and the personal rating of Detroit were found to be of signal importance. Marital status, having children of school age, and informal group participation appear to be negligible factors in distinguishing between individuals who are relatively active or inactive politically.

There was noted a strong relationship between an individual's attitudinal orientation toward the political process and his degree of political participation. Considering those persons with favorable opinions as

most integrated politically, those persons with unfavorable opinions less integrated, and those persons with no opinions least integrated, we found the above groups exhibited degrees of political participation which decreased in that order. Favorable attitudes toward, 1) the government as a problem solving agency, 2) the value of political parties, and 3) the value of making opinions known to governmental officials, were associated with relatively high political participation. Individuals expressing "don't know" attitudes were generally the lowest political participants.

Political affiliation in itself was not found to be related to political participation. Affiliates did not participate noticeably more than non-affiliates. Intensity of affiliation also, apparently was not a positive factor in political participation. Among affiliates, Republicans were greater participants than Democrats, but this distinction was due to other factors such as family income and prestige of occupation.

285 pages. \$3.56. MicA54-1601

### POLITICAL SCIENCE, INTERNATIONAL LAW AND RELATIONS

#### SOVIET NATIONALITY POLICY, 1917-1927: A STUDY OF BOLSHEVIK DOCTRINE AND PRACTICE WITH SPECIAL REFERENCE TO CENTRAL ASIA

(Publication No. 8338)

Alexander Garland Park, Ph. D.  
Columbia University, 1953

This essay seeks to trace the development of Soviet doctrine and practice concerning the nationality problem, especially as it related to the less advanced peoples of Russia, during the first decade of Soviet rule. Using pre-1917 Bolshevik doctrine as a basis for evaluating change, the study initially traces the general evolution of theory during the period of the October Revolution and Civil War in Russia, and shows how the concept of equality came to replace the concept of liberation as the basic content of the

Bolshevik doctrine of self-determination. The history of the revolution and civil war in Central Asia is utilized to show how these concepts were put into practice among several of the subject peoples of the Tsarist Empire. In a similar manner, the rise of the concept of Soviet federalism and its practical application in Soviet Central Asia is examined.

Later sections of the study relate to the efforts of the Soviet government to put into practice the concept of national equality in Central Asia and to transform the traditional Moslem community into a bulwark of the Soviet system. One part deals with the governmental and mass organizations through which the Bolshevik Party exercised leadership and control over the native community. Another deals with the efforts of the Soviet regime to "nationalize" administrative and governmental agencies by introducing the native languages into administration and by encouraging qualified natives to enter government service. A third examines the Soviet campaign to encourage mass participation in the governing process by the Soviets and the mass organizations; and a fourth considers the Bolshevik policy of undermining and destroying customary social institutions which were considered to be inimical to the interests of Soviet society.

The study also considers Soviet policies which were designed to equalize or level up the economic institutions of the national republics with those of Great Russia. The Soviet effort to create focuses of industry as well as to restore industrial plant and equipment destroyed or damaged in the revolution and civil war is examined both in terms of doctrine and of actual accomplishment. Similar consideration is given to the revival of agriculture and to the Soviet effort to destroy the customary rural community through a carefully planned and executed land reform. Lastly, the study seeks to evaluate the campaign to elevate the cultural levels of the backward peoples, principally through a Soviet educational system, and to inculcate the principles of Soviet culture in these peoples.

Tentative conclusions based upon developments in Central Asia during the first decade of Soviet rule indicate that accomplishments in national policy were still far short of announced Soviet goals. Real equality was nowhere achieved during the period; but of greater consequence, time itself appears to have modified many of the goals. Moreover, actual policy in its development tended increasingly to reveal a practical compromise between Marxian ideals and traditional Russian policies.

685 pages. \$8.56. MicA54-1602

## PSYCHOLOGY

### PSYCHOLOGY, GENERAL

#### THE LEARNING OF MORAL STANDARDS

(Publication No. 8266)

Wesley Allinsmith, Ph. D.  
University of Michigan, 1954

Moral behavior may be motivated by internal as well as by external forces. Internal standards are learned through processes called "introjection" and "identification." These occur in response to threat or feelings of weakness. Intensely fearing loss of approval, the child complies with parental prohibitions. Wishing to be able to master the environment like powerful adults, he adopts the parents' ideals. Under certain conditions, he "takes in" these injunctions in such a way that he acts, thenceforth, as though he had within him a force (popularly, the voice of conscience) which threatens him as he previously perceived himself threatened in reality. Thus a person - in a situation which, for him, has moral connotations - observes himself; warns or exhorts himself; makes demands of himself; and, according to the degree of his conformity to the internal demands, praises and indulges or blames and punishes himself, even when there is no possibility of external reward or censure. "Superego" is the term used when referring to an individual's internalized standards. When temptation or necessity has led, despite Superego objection, to infraction of a standard, the

individual experiences Superego-anxiety, which is called guilt. Guilt may or may not be conscious. This is because Superego-anxiety, like impulse-anxiety, can be defended against.

Internalized standards can be viewed as having four aspects: the moral area, the extensity, the height, and the severity. The severity is the amount of punishment exacted by Superego for a given action. The present research is concerned with the measurement of defense against guilt and with the measurement and prediction of severity of internalization. The subjects were 112 junior high school boys and their mothers. Over a dozen factors such as age and intelligence were controlled, either in the selection of subjects or statistically. The mothers were interviewed in their homes about the boys. The interview yielded four predictive variables. For complex reasons, higher severity was expected to be predicted by "psychological" as opposed to direct-attack types of discipline, by coercive bowel training, by oral frustration (measured from earliness of weaning), and by middle as opposed to lower social class position. The first three predictors were found to be independent of one another. As expected, all were related to social class.

The boys were studied at school. They took a story-completion projective test especially designed by D. A. Rhodes and the writer to measure aspects of internalization. Risk of getting caught in moral infractions was eliminated in the test so that reactions to infraction could not be interpreted merely



as responses to fear of external censure. Severity of internalization was scored by measuring the intensity of guilt in the projective stories. Three moral areas were covered by the items.

Intensity of guilt over hostile thoughts was successfully predicted by discipline type. It was also predicted by coerciveness of bowel training and by oral frustration when the aggressive wish found "realization" in an environmental event, but not when the wish remained unrealized. Social class predicted in neither case. The theoretical expectations for disobedience and stealing were less clear than for aggression. Nevertheless predictions were made in the same direction, because theorists have conceived of "severity of Superego" as generalizing across moral areas. These corollary predictions are not borne out. Instead, high coerciveness and high oral frustration are related to lower intensity of guilt over disobedience. No variables at all are related to intensity of guilt over stealing. Almost all the subjects were high in guilt about stealing. This interesting homogeneity prevented prediction for lack of clearly contrasting groups.

Two conclusions are appropriate. (1) In the area of aggression, which is crucial for an understanding both of neurosis and of normal personality in our culture, the theory is basically sound. (2) Internalizations in different moral areas are not necessarily alike in degree or in origin. It is necessary to speak of "guilts" rather than "guilt," and Superego should be viewed as a complex of positively and negatively intercorrelated internalizations.

Defensive distortions appeared clearly in the story-endings, especially the mechanism of "projection of standards." The capacity of the test to measure defense against guilt enhances its usefulness. Implications of the entire study for future experimentation are discussed.

231 pages. \$2.89. MicA54-1603

#### THE SZONDI TEST AND CRIMINALITY

(Publication No. 8187)

William Frank Caston, Ph. D.  
Vanderbilt University, 1954

Supervisor: Professor Arthur Canter

One of the central concepts running through Deri's book on the Szondi Test is that criminals and antisocial psychopaths react differently from normals on the test, and that certain configurations are characteristic of the profiles of these individuals. The general purpose of this study was to determine whether the Szondi Test can differentiate, by means of the fourteen factorial and vectorial configurations hypothesized by Deri as having significance for criminal and antisocial behavior, between a prison population composed of convicted inmates and a non-prison control group of law abiding citizens who are normal with respect to apparent lack of psychiatric disabilities and who have not been convicted of criminal activities.

An Experimental Group of 50 prisoners was obtained at the Tennessee State Penitentiary at Nashville, and a Control Group of 50 airmen was secured at Sewart Air Force Base, Smyrna, Tennessee. A

supplementary group of subjects was composed of 32 airmen prisoners in the Sewart Base Stockade.

The Szondi Test was administered individually six times to each subject with at least a 24-hour period between administrations, in accordance with Deri's suggested procedure. The profiles of the subjects of the various groups were compared with regard to the presence or absence of the individual factorial and vectorial configurations or "signs" and patterns of signs.

On the basis of the statements made in Deri's book, the following hypotheses were made:

(1) The factorial and vectorial configurations or "signs" on the Szondi Test, which according to Deri have significance for criminality, will differentiate between a prison population composed of individuals who are serving sentences for crimes for which they have been convicted and a non-prison, "normal" population. That is, more individuals in the prison population will be deviant according to Szondi signs than in a sample of equal size from the presumably normal population. Two methods of utilizing the signs appear possible:

(a) Each of the signs can be examined separately to determine whether they differentiate individually between the criminal and the normal population.

(b) Combinations of the signs can be examined to determine whether the configurational patterns differentiate significantly between the groups.

(2) The prison population will show greater variability in test performance than the non-prison population. That is, changes in factorial directions and amount of the changes over the series of administrations will be greater for the prison population.

(3) More of the prison population will have ratios of the Sum of Open Reactions to the Sum of Plus-Minus Reactions of 5 or larger than the normal population.

The results of this study indicated that Hypothesis #1 could not be supported completely, as only one of the separate signs differentiated individually between the criminal and the normal populations. However, two configurational patterns of "positive" signs differentiated significantly between the groups. The greater the number of these eleven signs considered indicative of criminality (the other three of the fourteen signs are considered counterindicative) found in the profile of an individual, the more likely he is to belong to the criminal group.

Hypothesis #2 was supported by the results of this study. Greater variability in test performance appears to be a valid indicator for discriminating between normal and criminal behavior.

Hypothesis #3 was not upheld. The ratio of the Sum of Open Reactions to the Sum of Plus-Minus Reactions did not discriminate between the groups.

These results generally tend to give some support to Deri's interpretations of the factorial and vectorial configurations as they apply to criminality.

Some general indications for the use of the test and suggestions for further research were given.

80 pages. \$1.00. MicA54-1604

# A STUDY OF NON-SENSORY DETERMINANTS OF RECOGNITION THRESHOLDS

(Publication No. 8296)

Stanley Chittenden Duffendack, Ph. D.  
University of Michigan, 1954

A percept is not necessarily identical to the stimulus to which it is a response. In identifying the determinants of perception experimenters have found that recent experience or set, past experience, and personality are important. It has also been suggested that the process of percept formation differs for stimulus classes of differing motivational properties. This study was designed to investigate the process of percept formation, to see if it differs as recognition thresholds of different word classes vary, and to investigate the effect of situational factors (set) and personality upon perception.

The recognition thresholds of neutral and emotional words were measured in four experimental conditions: 1. General anxiety, 2. Freedom from general anxiety, 3. Pictures present representing the neutral word class, 4. Pictures present representing the emotional word class. The prerecognition guesses of the ten subjects were classified to provide an indication of the process of percept formation. Thresholds of high and low manifest anxiety groups were compared.

The hypothesis that perceptual threshold is a function of the level of response availability was sustained by finding an inverse relationship between the threshold level of a word class and the percent of prerecognition guesses in that word class.

The hypothesis that differences in the threshold of emotional and neutral words change as general anxiety lessens was not sustained. The hypothesis that situational factors similar in meaning to emotional stimuli have a greater effect upon thresholds than do situational factors similar in meaning to neutral stimuli was not sustained.

The hypothesis that the thresholds of high and low manifest anxiety groups are different was not sustained. Two groups were isolated which differed in the relation of neutral and emotional word thresholds in the initial condition. Group I had a lower threshold for emotional than for neutral words in condition 1 but had no differences thereafter. Group II had no differences till condition 4, when emotional word threshold was lower than that of the neutral words. The two groups also differed in their prerecognition guesses in such a way that the behavior is interpreted to indicate that Group I imposes organization upon an unclear stimulus while Group II responds to discriminated stimulus elements and imposes less organization upon the stimulus.

Three conclusions are drawn from these results:

1. There is an inverse relationship between level of recognition threshold and the level of availability of the appropriate response. It is therefore unnecessary to assume different processes of percept formation to explain differences in threshold level.

2. Differences in the effect of the situation upon thresholds have not been established. This failure

is attributable to the small sample and further experimentation is needed to test the hypotheses.

3. It is possible to identify two groups which differ in the process of percept formation and in the relative thresholds of words of different class under certain conditions. These differences are interpreted to be a function of differences in the tendency to impose organization upon stimuli, and to parallel the personality dimension of dependence - non-dependence.

71 pages. \$1.00. MicA54-1605

# PAST EXPERIENCE AND PERCEPTION: A STUDY OF THE INFLUENCE OF PAST EXPERIENCE ON APPARENT SIZE AND DISTANCE

(Publication No. 8166)

William M. Smith, Ph. D.  
Princeton University, 1950

This study attempted to assess the effect of controlled, concrete experience on the apparent size and distance of monocularly viewed geometrical forms. The observational situation presented to each observer was a well-structured alley seen binocularly, and at the same time a white projected geometrical figure seen only with the right eye. Under the conditions of the experiment a continuous change in size of the projected geometrical figure was perceived as a change in apparent depth.

Fifty-two high school children, both boys and girls in the ninth and tenth grades, participated in the experiment. All subjects possessed 20/20 vision.

Each subject participated in two experimental sessions, a Test and a Retest. In addition, subjects in a main experimental group took part in a number of "games" interpolated between the Test and Retest. In the Test session all subjects made six observations alternately on each of two geometrical figures, an equilateral triangle and a circle. The task required in each case was to state when a particular figure appeared at the same apparent distance as a particular object in the binocular field. When this equality of distance was obtained the size of the project figure was determined.

On the basis of Test data for the triangle subjects were assigned to four groups: (a) Subsidiary Experimental Group. N = 9. This group was made up of subjects whose localization judgments of the triangle were all in front of the reference object in the binocular alley; (b) Subsidiary Control Group. N = 9. Subjects in this group were those whose mean measured size of the triangle was greater than two inches; (c) Main Experimental (N = 17) and Main Control (N = 17) Groups. Subjects in these two groups were those whose mean measured triangle size was between one-half and two inches. The assignment of subjects to these groups was random.

The interpolated experience provided the main experimental subjects between Test and Retest consisted of a number of "Games" involving a form



board and minutely graded series of white opaque lucite triangular and square forms. All forms were approximately four inches large (side dimension). Three sessions of about two hours each were required to complete the "games."

Each subject returned for Retest observations approximately two and one-half weeks following the Test. The observations required at this time were the same as those required in the Test, with two exceptions. The first observation of each subject consisted of localizing a triangle whose size was equal to the mean size obtained from Test data. The localization was made relative to the reference object in the binocular alley. The six observations following this one were identical to the six made in the Test. The last observation required was the localization of a four-inch square. In the Retest an additional variation in procedure was introduced for subsidiary subjects only. Just before making the observations noted above, each subject in the Subsidiary Control Group was casually shown models (similar to the "game" objects) equal in size to his mean size of the triangle and circle obtained in the Test. Each subject in the Subsidiary Experimental Group was shown three-inch models of a triangle and circle just before making the Retest observations.

The results obtained permitted evaluation of the experiment principally on the basis of three main comparisons: (a) The comparison of Test-Retest size distributions on the triangle and circle for both main groups; (b) The comparison between the main groups of the localization of the initial Retest triangle; (c) The comparison between the main groups of the localization of the four-inch square. These comparisons supplemented by individual data of subsidiary subjects plus verbal material obtained in individual interviews conducted at the end of the experiment justified the following conclusions:

1. Specific experience was effective in altering the apparent size of a particular geometrical figure (triangle).
2. This alteration in apparent size was in most cases accompanied by a concomitant change in apparent distance.
3. The effect of the experience was specific as to object shape, since no significant size alteration occurred for a control figure (circle).

These conclusions along with other pertinent data were interpreted as indicating an instance of intra-sensory modification due to experience plus the operation of a certain assumptive factor regarding size as a clue to distance. The overall results were discussed from an empirical view of perception.

107 pages. \$1.34. MicA54-1606

## PSYCHOLOGY, CLINICAL

### ACCURACY OF SELF-APPRAISAL AND CLINICIANS' INTERPRETATIONS OF RORSCHACH PROTOCOLS

(Publication No. 8290)

Kenneth Simon Davidson, Ph. D.  
University of Michigan, 1954

This experiment concerns the relationship between accuracies of clinicians' interpretations of their own and others' personalities. The primary hypothesis states that the accuracy of evaluation of others' characteristics from given behavioral data is directly related to the accuracy of self-appraisal on the same variables.

Sixteen clinical psychologists rated the Rorschach test records of 10 patients on 48 statements involving 14 personality variables. Then the psychologists judged themselves on the same scale. Therapists provided criterion judgments of the patients, and the clinicians were rated by their supervisors.

The areas of personality covered by the 48 statements included six "source" variables: hostility, passive-dependence, level of aspiration, rigidity, super-ego, and intellectual capacity. For each of these, statements were developed in terms of each of the following "reaction" variables: compulsive symptoms, projection, withdrawal, reaction formation, anxiety, feelings of inferiority and insecurity, depression, and authority relations.

The plan of the experiment may be outlined as follows:

1. Clinician rates patient's Rorschach protocol.
2. Therapist rates patient.
3. Clinician rates self.
4. Supervisor rates clinician.

Discrepancy A is the difference between clinician's and therapist's views of patient.

Discrepancy B is the difference between clinician's and supervisor's views of clinician.

The experimental discrepancies, A and B, provided measures for testing three hypotheses.

1. Accuracy of self-appraisal, computed without regard to positive or negative direction of errors, is directly related to accuracy in evaluating others on the given variables.

2. The algebraic discrepancies, computed with both magnitude and positive or negative direction considered, are directly related. This was an exploratory part of the study and the assumption was made that the hypothesis would not yield significant results.

3. Frequencies of "accurate" ratings of patients by clinicians are significantly greater than chance.

Following are the findings:

1. There is a significant, direct relationship between accuracy of self-appraisal and correctness in evaluating others for the given variables. Self-insight was found a significant source of error in rating people on the variables of passivity, level of

aspiration, intellect, compulsive symptoms, withdrawal, reaction formation, and depression.

2. There is a slight, though not statistically significant, tendency for clinicians to evaluate others through the self-referent mode of evaluation. The results indicate a trend toward self-referent judgments on the variables of withdrawal, depression, and authority relations. Projective distortions tend to occur in evaluating compulsive symptoms and feelings of inferiority and insecurity.

3. Individual clinicians are significantly above chance in the accuracy of their ratings of patients' Rorschach data. However, in testing the validity of judgments of the individual variables, significantly "accurate" ratings are found on only four variables: level of aspiration, super-ego, projection, and withdrawal.

The findings of these investigations were discussed in terms of their theoretical, experimental, and practical significance. We stressed the point that increasing insight into one's own personality and any characteristic mode of evaluating people may aid psychologists in attaining greater accuracy and clinical proficiency in their interpretations of personality.

109 pages. \$1.36. MicA54-1607

#### TEST PERFORMANCE OF PRE-SCHOOL CHILDREN WITH AND WITHOUT ORGANIC BRAIN PATHOLOGY

(Publication No. 8253)

Miriam Stearns Haines, Ph. D.  
Columbia University, 1953

The diagnosis of brain injury is of major importance. Available evidence has warranted the conclusion that no single neurological or psychological "sign" is sufficiently pathognomonic of intellectual impairment due to brain injury to be used as the sole criterion. Therefore, the battery of verbal and performance tests which comprise the Merrill-Palmer Scale was selected to be used in conjunction with the neurological examination and laboratory tests such as the electroencephalogram in an effort to assist in the diagnosis of brain damage in young children.

The purpose of this study is to investigate whether or not brain injury in young children can be detected on a standard psychological scale.

It is hypothesized that young children with brain injury will show decreased efficiency on tests involving conceptual thinking, visual-motor skill, and perceptual judgment. Conceptual thinking in this study is conceived as the ability to form a concept, to classify according to a common factor. Visual-motor skill is dependent upon eye-hand coordination, finger dexterity, speed of reaction time, spatial evaluation, and visual memory. Perceptual judgment implies the discriminative observation of differences, relationships, and organizations.

The experiment was designed for a brain-injured group of 100 children and two non-brain-injured

groups consisting of 100 behavior-problem and 100 foster-home children to whom the Merrill-Palmer and the Revised Stanford-Binet, Form L, were administered. An analysis of the abilities in the Merrill-Palmer was made as a preliminary step so that the abilities involved in each test was defined prior to the analysis of the relevant data. Three competent people were chosen on the basis of clinical experience with the Merrill-Palmer Scale to check on the writer's analysis of abilities. The combined efforts resulted in a grouping of the tests in terms of the abilities in each test as they relate to the hypothesis under investigation.

The criterion set for a test was that it must differ significantly from the other seven tests at the .05 level or beyond. When the *t* test of the significance of the differences between the means of the three groups, for each subtest, was computed, it was found that no test was significantly different at the .05 level in all seven instances. When the formula for the significance of the differences between correlated means was used, and the *t* test was applied to all differences between subtest means within each group, no one test was found to reach significance at the .05 level in all seven instances. A further step of employing the discriminant function was taken to find the common probability of correctly classifying a child into one of the three diagnostic groups. This was found to be only .35 while purely on the basis of chance the probability is .33. Thus, the null hypothesis must be accepted in terms of the criterion and the hypothesis that young children with brain injury will show decreased efficiency on tests involving conceptual thinking, visual-motor skill, and perceptual judgment cannot be substantiated by using Merrill-Palmer subtests.

It is concluded that specific subtests on the Merrill-Palmer cannot be used for differential diagnosis because they failed to discriminate brain-injured, behavior-problem, and foster-home children. This may be because abilities at this young age level are general rather than specific. Other studies which report significant differences dealt with older children and adults. It is also possible that the Merrill-Palmer as a measuring device is not a sensitive enough instrument to differentiate degrees of conceptual thinking, spatial evaluation, and perceptual judgment as those tests which have been specifically designed for differential diagnosis. The present research has been in line with the recent trend to have intelligence tests perform the additional function of contributing to neuropsychiatric diagnosis.

62 pages. \$1.00. MicA54-1608

#### THE CHANGING FAMILY RELATIONSHIPS OF ADOLESCENT GIRLS

(Publication No. 8175)

John V. Liccione, Ph. D.  
Syracuse University, 1954

This investigation concerns the changing relationships of adolescent girls to their parents. According



to orthodox Freudian theory (the framework used in this study), the following trends would be expected during adolescence: (1) Relationships between girls and their mothers should be characterized by more conflict and less tranquility than their relationships with their fathers. (2) The peak of tension and disequilibrium between mother and daughter should occur at puberty or shortly thereafter. (3) Correspondingly, the least amount of tension or disequilibrium between fathers and daughters should occur at the pubertal period. These predicted relationships represent the hypotheses to be examined.

Twelve Thematic Apperception Test cards were administered to 50 girls at each of ages 9, 11, 13, 15, and 17. The stories were electrically recorded and analyzed mainly to identify themes relating directly to parent-child relationships, utilizing a lengthy check-list of themes classified as "interpersonal," "intrapersonal," and "impersonal," and as "disequilibrium" (tension) and "equilibrium." Reliability of the analysis, as determined by comparison with an independent observer's results and with later self-check, proved satisfactory.

Approximately 25 per cent of the 14,662 themes dealt specifically with parent-child relationships. Unfortunately parent-child "disequilibrium" themes outnumbered "equilibrium" themes about five to one; thus the findings that follow relate mainly to the analysis of the "disequilibrium" themes.

1. When themes involving both sex parents and both sex offspring as characters were combined, disharmony between parents and daughters appeared to increase from 9 to 15 and to decrease to 17, though the latter was unreliable.

2. When themes involving both sex parents and both sex offspring as characters were combined, harmony between parents and daughters appeared to decrease from age 9 to 15 (somewhat irregularly, however) and then to increase to age 17.

3. When the analysis was restricted to those themes involving specific mention of disharmony between mothers and daughters, mother-daughter disharmony appeared to increase to age 15, though irregularly, and to decrease to 17. This decrease, however, proved to be statistically unreliable.

4. When the analysis was restricted to those themes involving specific mention of disharmony between fathers and daughters, father-daughter disharmony appeared to decrease from ages 9 to 15, albeit irregularly, and then to increase to age 17.

5. Significantly greater interaction (both disharmony and harmony) in the mother-offspring than in the father-offspring relationships was noted at all five age levels. The total group of subjects averaged 8.8 mother-offspring themes compared with 4.0 father-offspring themes. Examination of the stimulus pictures used revealed no special situational bias to account for these differences, suggesting the difference to be a reflection of the actual situation.

6. The proportions of the mother-offspring themes classified as equilibrium and disequilibrium approximately equaled the proportions of father-offspring themes of an equilibrium and disequilibrium type, suggesting the greater mother-offspring disharmony

to be a function of greater interaction of mothers and daughters.

The empirical relationships established by this study, if corroborated by other studies, must be explained by an adequate theory of adolescent development. The findings are not compatible with Freudian theory at all points, and require further research. Freudian theory asserts a resurgence of the Oedipal situation for both sexes. However, a social-cultural interpretation would suggest the existence of different age trends in parent-adolescent relationships for boys than for girls. For these reasons, a parallel investigation of boys' relationships with their parents is planned. Such a study, in conjunction with the present data, should provide a more adequate basis for favoring a Freudian or a psycho-social interpretation of the data.

163 pages. \$2.04. MicA54-1609

#### DIAGNOSTIC EFFECTIVENESS OF INTERPRETIVE TESTS

(Publication No. 8247)

David Markenson, Ph. D.  
Washington University, 1953

Chairman: Robert I. Watson

The present day concept of a diagnosis demands that the clinical psychologist in evaluating a patient arrive at data which will help in the understanding of the patient's characteristics in relation to the nature and origin of his difficulties. In terms of the prevalent trends in psychiatry and psychology this means, among other things, seeking an understanding of the patient's feelings, thoughts, reactions, and needs in regards to interpersonal relations. Such projective interpretive tests as the Rosenzweig Picture-Frustration Study, the Sentence Completion Test, and the Thematic Apperception Test, since they provide the individual with an opportunity to interpret socially relevant stimuli, appear to be the logical instruments to be employed in exploring what he thinks and how he feels about important figures and varied social situations in his environment. However, the application of these tests in the individual case study suffers from an absence of normative data on the reactions of various clinical groups on these tests, and from a lack of formal research on their diagnostic effectiveness. Reports concerning the effectiveness of a battery of interpretive tests in determining "group belongingness" are conspicuous by their absence. The purpose of the present study was to investigate this latter problem through the application of a battery of three commonly used interpretive tests to subjects belonging to two clinical populations which, as groups, are known to behave differently and are assumed to have somewhat different psychodynamic bases for their disorders.

The following procedure was used in the investigation. The productions of twenty paranoid schizophrenic patients and of twenty duodenal ulcer patients

in responding to the Rosenzweig Picture-Frustration Study, the Structured Sentence Completion Test, and the Thematic Apperception Test were scored by some of the standard methods available for the purpose. Care was taken to evaluate the objectivity of the scoring by getting measures of interscorer agreement between independent scorers on each test. The results on the three tests were summarized for each of the groups employed, and the various types of reactions given quantitative values. These quantitative results were treated statistically to determine statistically significant differences between the two groups. Finally the data, based on the significant differences found between the groups, were applied by three judges in a blind analysis of responses belonging to ten new cases divided equally between, and chosen from, the two populations from which the original forty cases were also drawn. All three judges were able to classify correctly every one of the subjects, whose test productions they analyzed, as belonging to either the paranoid schizophrenic or the duodenal ulcer group.

While the study deals primarily with the problem of the sensitivity of interpretive tests to group differences, the data comprising the results reveal, also, some of the typical reactions of the two clinical groups employed in this investigation. The psychodynamics which appear to underlie these reactions were compared to the empirical findings concerning the personality dynamics of paranoid schizophrenics and of individuals with a duodenal ulcer and were often found to be in agreement.

The results of this essentially exploratory investigation are interpreted as supporting the assumption that interpretive tests, used as a battery and analyzed by the methods employed in this study, can be effective in: (a) diagnostic work involving distinct clinical populations and, (b) exploration of typical group characteristics of clinical groups in terms of psychological variables having a social reference.

153 pages. \$1.91. MicA54-1610

## PSYCHOLOGY, EXPERIMENTAL

### THE RELATION OF INTELLIGENCE LEVEL AND TRANSIENT MOTOR RESPONSE TO STEP FUNCTIONS IN SELECTED GROUPS OF CHILDREN

(Publication No. 8243)

Robert Harold Alexander, Ph. D.  
Washington University, 1953

The problem of this study was to determine whether there is any relationship between intelligence level and characteristics of the transient motor response to a step function. The experimental group consisted of 79 school age children of which 54 were feeble-minded and 25 were intellectually normal.

Intelligence level was determined on the basis of the results of the Stanford-Binet Intelligence test. A subject activated tracking recorder was used to

obtain the motor response data. The motor response characteristics were determined by means of a transient response simulator which facilitated the matching of the experimental response curves with curves of known physical systems. Pearson  $r$  correlations were used to obtain correlation coefficients and "t" tests were used to find differences between means of feeble-minded and normal groups.

The relationship between intelligence level and each of the following characteristics were investigated:

- (a) initial time, or finite time lag, between stimulus and motor response
- (b) time to reach 90 per cent of the total response level
- (c) the time constant of an exponential component in the response curve
- (d) the form characteristics of a quadratic component  $T_q$  and  $\theta$

Significant correlations were found between intelligence level and  $T_{90}$ . Certain other characteristics, indicative of the form characteristics of the response, were fairly close to significant. In these cases it is desirable to investigate larger groups and by so doing, to determine more decisively whether the correlations in question represent a genuine relationship.

The primary motor factor associated with differences in intelligence seems to lie in overcoming the initial inertia prior to the beginning of the motor response. There is also a difference in response time once the response is underway as shown by measurement of the 90 per cent time. The results thus indicate that it is the rapidity of the response that apparently has the most direct relation to intelligence level.

There were two possible goals: (1) the possibility of using one trait as an index to the other, (2) the possibility of obtaining information on physiological properties which underly both traits. The purpose of this study was to find if any real differences existed between the two types of traits, motor characteristics and intelligence measures. The subsequent application of these correlations must be a subject for further study. A much higher correlation is necessary when using a given trait as a basis for prediction of a second trait in an individual than when reaching for evidence of common properties underlying both traits of a group of individuals.

77 pages. \$1.00. MicA54-1611

### DELAYED EFFECTS OF NATAL ANOXEMIA UPON BEHAVIOR AND ELECTROENCEPHALOGRAPHIC ACTIVITY

(Publication No. 8248)

Gilbert Walter Meier, Ph. D.  
Washington University, 1953

From the review of the literature pertinent to a consideration of the psychologically deleterious effects of infantile anoxemia, these premises were



drawn whose affirmation seemed mandatory before the clinical reports could be properly evaluated:

1. Among the organs of the body, the central nervous system is necessarily one of the most susceptible to oxygen deficits. Within this system there is a hierarchy of susceptibility from the most complex cerebral centers to the tracts of the spinal cord.
2. The use of drugs to alleviate the pains of labor and delivery may be an effective anoxic agent to the infant.
3. Anoxemia, by whatever means, can effect permanent changes in the central nervous system.
4. So that organismic survival can occur, the relative order of tolerance of this oxygen insult is such that the immature organism is more tolerant than the more developed forms.
5. Experimental studies in which this deficiency is incurred in the newborn in a controlled situation yield results of like nature to those accumulated in the clinic.

The review confirmed the soundness of the first four premises. This investigation was designed to test the fifth specifically as stated in these hypotheses: natal anoxemia effects in a significant portion of the experimental population 1) poorly adapted responses which may be called "stereotyped," 2) retardation in the learning of complex tasks, and 3) poor acquisition and retention of symbolic behavior.

At the age of six months 26 kittens were tested on a battery of behavioral problems. Of these kittens 14 were exposed to an oxygen deprivation (2.97% equivalent oxygen for 30 minutes) immediately after birth; the remaining 12, littermates, were the controls.

The battery of behavioral problems included the following with the hypotheses specified for which they were designed:

- (a) Guthrie puzzle box: hypothesis 1
- (b) Single unit "T" maze (brightness discrimination): hypotheses 1 and 2
- (c) Temporal "T" maze (double alternation problem): hypotheses 2 and 3
- (d) Multiple choice apparatus (brightness discrimination): hypothesis 2

With limitations, the results tended to confirm the hypotheses. Although the number of identical responses (for each subject) did not differ in the two groups on the Guthrie puzzle box, the experimental animals exhibited considerably greater latencies of response. In the discrimination task on the single unit maze a significantly greater proportion of the anoxic animals failed to learn the task and fixated ("stereotyped"), instead. The second brightness discrimination problem indicated that there was no real difference in the groups to make a distinction between black and white discriminanda. An inferior ability to retain a symbolic response was denoted on the alternation problem, confirming the third hypothesis.

The statistical analyses were made with non-parametric methods. This type of statistical procedure was necessitated by certain peculiarities of the data.

The statistics were the Mann-Whitney  $U$  test, Chi square, and Kendall's  $T$ .

Included in the study was a longitudinal investigation of the electroencephalographic activity. This commenced with the period of deprivation for the experimental animals and the day following for the litter-mate controls. Further recordings were made at the end of the first, second, third, and fifth months, and upon completion of the behavioral tests. As the recordings on the immature subjects proved to be unreliable no evaluation could be made of the tenet that the experimental animals would show a different pattern in the development of this activity (prolonged, slow frequencies and low amplitudes - a perseveration of the pattern seen in the period of deprivation). The activity of the mature animals exhibited no difference for the two groups of subjects.

84 pages. \$1.05. MicA54-1612

#### THE PERSONALITY INVENTORY CORRELATES OF THE LEVEL OF ASPIRATION

(Publication No. 8261)

Kyle Karr Pierce, Ph. D.  
University of Arizona, 1954

The problem with which this study was concerned was the discovery of whatever relationships might be found between personality inventory scores and the discrepancy between the level of performance and the subsequent level of aspiration.

The experimental procedure was an orthodox administration of two level of aspiration tasks, dart-throwing and card-sorting, to a population of college students. From the statements of aspiration and the records of performance, the primary measure of aspiration was derived. This was the D-score, representing the discrepancy between the level of aspiration and the subsequent level of performance.

The scores derived from the aspiration tasks were correlated with the scores resulting from the group administration of the Minnesota Multiphasic Personality Inventory and the Guilford-Zimmerman Temperament Survey. Correlations were obtained that were significant at the one and five per cent levels of confidence.

The personality scales whose correlation with the D-scores had produced significant coefficients were subjected to an item analysis and the results of this analysis examined to see which component variables of the scales were most influential.

Differences between means of selected personality scale scores for the upper and lower quarters of the D-score distributions were tested by means of critical ratios and the results indicated that the differences generally were significant.

Two general conclusions were developed. The first of these was that significant relationships were found to exist between personality inventory scores and discrepancy scores. Second, examination of the personality variables, which the inventory authors

attributed to those scales producing significant correlations with the D-scores, exposed a group of characteristics paralleling those which Jung imputed to his typology of introversion-extraversion. This relationship was of a degree high enough to suggest that the height of an individual's discrepancy score was, in part, a function of his directional tendency

on the continuum of introversion-extraversion. Specifically, the tendency toward extraversion increased as the height of the discrepancy score increased, while the tendency toward introversion increased as the height of the discrepancy score decreased.

143 pages. \$1.79. MicA54-1614

## RELIGION

### JEWISH CONCEPTS OF THE SERVANT OF THE LORD IN DEUTERO-ISAIAH

(Publication No. 8238)

Rabbi Eugene J. Cohen, Ph. D.  
Boston University School of Theology, 1954

Major Professor: Elmer A. Leslie

The purpose of this dissertation is to study the opinions of Jewish scholars on the "Servant of the Lord Songs" (Isa. 42:1-4; 49:1-6; 50:4-9; and 52:13-53:12) from the end of the Old Testament period to the present day. The writer has attempted to include every Jewish commentary as well as leading and representative non-Jewish scholars.

#### Conclusions

1. The author of the Songs is called Deutero-Isaiah, for want of a better name, for he succeeded in maintaining for himself the anonymity which he chose. He lived in Babylon together with his exiled people, and wrote immediately prior to the conquest of Babylon by Cyrus.

2. The word that the poet employs to express the most exalted concept is 'Ebed. This word would normally be translated as slave or servant. Deutero-Isaiah meant to express the total negation by the Servant of his own will in favor of that of his Lord.

3. The identity of the Servant has to this day remained a mystery. The present writer maintains that the Servant is not an individual and is not to be identified with any one people. He is the composite of all human beings who strive for the establishment of the Kingdom of God on earth. The position of the Messiah in this regard is that of the leader and spokesman, but his being is only important when, like a general, he is supported by a well-trained and well-organized army. The army is important for generals come and go. In view of the fact that the Messiah is not the end of all things but the beginning of a line of Messiahs, his task is only to lead and prepare the way for successive leaders.

4. The Servant, all of the world's noble souls, will be looked on with scorn by those who doubt the possibility of the new era in which they preach and live, and by those who openly oppose a change in the status quo. These noble Servants will be considered so debased and caused to suffer so inhumanly that they will no longer be regarded within the pale of

human society. But the Servant has always been ready for every sacrifice rather than betray his cause.

5. For this task, the Servant is prepared even before he sees the world, while yet in the womb of his mother. These saintly and gifted souls are to bring the light to all peoples. The Servant is endowed with many abilities, but his greatest is to suffer for others, and in the midst of his suffering to pray for the lives of his persecutors. This vicarious suffering is voluntarily assumed.

6. The Messianic era will appear like the sun in the morning. First a little light and gradually it will increase. It will be different from the present age only with respect to the fact that all nations will live in peace. During this age the minds of men will be devoted to productive things, and thus the condition of man will constantly improve. Following this era, which may last several centuries, another era will begin called the World to Come, which is outside the sphere of this work.

7. The essential message of the poet is centered around his concept of God. Being the Lord of all, he is vitally concerned with the future and the destiny of man.

355 pages. \$4.44. MicA54-1613

### A STUDY OF THE BOOK OF ZEPHANIAH: AS TO THE DATE, EXTENT AND SIGNIFICANCE OF THE GENUINE WRITINGS, WITH A TRANSLATION

(Publication No. 8189)

Ambrose Edens, Ph. D.  
Vanderbilt University, 1954

Supervisor: Professor J. Philip Hyatt

This study of the book of Zephaniah has two primary goals: to determine the date of Zephaniah's activity and the extent of his genuine oracles. It would hardly be possible to accomplish the one without considering the other, for they are inseparable and mutually interdependent problems. What is considered genuine depends to a large degree on when Zephaniah was active, and clues as to his period of prophesying are dependent upon what we accept as genuine passages.



But our study goes beyond the question of time and extent of his work to consider its significance. What did Zephaniah mean by his declarations? Where does he stand in relationship to his predecessors and his successors? What influences are to be seen upon and by Zephaniah?

The first step is a critical examination of the book to see what scholars and commentators have seen occasion to question as to authenticity. This serves as a guide in continuing the survey.

Theories which have been advanced as to the historical setting of the book are then carefully weighed, including these possible periods: (1) before 621 B.C.; (2) after 621 but in the time of Josiah; (3) the time of Jehoiakim; (4) the Greek period, near 250, as a pseudepigraphic composition of an apocalypticist.

To arrive at the most probable date for Zephaniah I then proceed through the book, verse by verse, to see what date would be most appropriate for the individual passages or oracles. This leads to the conclusion as to the most probable date.

Once the superscription is seen as editorial, little remains to cause one to think of the time of Josiah. The Scythians of Herodotus must be properly discounted as a causative factor, as also seems to be the case in Jeremiah. True, there are many declarations which fit the circumstances of Josiah's time, but these are also appropriate to the time of Jehoiakim, near 600 B. C. Especially does such a date seem indicated by the expression, "the remnant of Baal." The oracle against Moab and Ammon (2:8-11) and the oracle concerning Philistia (2:4-7) take on new meaning when seen in the light of II Kings 24:1f. The Assyrian oracle (2:13-15) appears to be a prophecy *post eventum*.

In Zephaniah's writing is to be found something of the apocalyptic, for he seems to envision calamity far beyond the realm of mere enemy action. His thought mingles direct action of Yahweh with a possible human agency, but if he had a specific enemy in mind, the Chaldeans are a far more real possibility than Scythians, unsupported by Biblical, Assyrian or Egyptian sources, and supported only by the unreliable Herodotus.

Zephaniah appears to have been influenced by his predecessors as one might expect, especially by Amos and Isaiah. His conception of the Day of Yahweh as a day of wrath seems cut from the same cloth as that of Amos, yet more extreme. As Isaiah, he stands forth for the "meek" in contrast to the haughty and arrogant.

His influence on his successors has not yet ceased. He appears to have been one of the roots from which later apocalyptic thought grew and flourished. His idea of a day of doom and destruction for all has carried over into the New Testament "Judgment Day," and is still kept alive in certain theological circles.

The study concludes with a translation of Zephaniah wherein it is indicated which portions I believe to be original and those which I see as probably additions. Most notable among the additions are 1:1; 2:7, 11; 3:9-20.

195 pages. \$2.44. MicA54-1615

## THE "SAINTS" OF CLAPHAM: THEIR MOTIVATION AND THEIR WORK

(Publication No. 8240)

Warren Bryan Martin, Ph. D.  
Boston University School of Theology, 1954

Major Professor: Edwin P. Booth

The purpose of this dissertation is to make an analytical and descriptive approach to the life and ministry of a brotherhood of Evangelicals in the England of the late eighteenth and early nineteenth centuries, who were called in their own time the "Saints" of Clapham, and who have been known since then as the Clapham Sect. This effort attempts to show that the message of the Evangelical Revival of the eighteenth century was the unifying principle of the Clapham Sect, and that this religious impulse, personally embodied and adapted, was the basic motivation for the witness and work of the Sect.

In an England that was at once old and new, the Clapham Sect developed and began its ministry. They were a group of friends in the village of Clapham identifiable by their culture, refinement, and means, joined with deep religious piety, and demonstrated in philanthropy and public service. The "Saints" included John and Henry Thornton, Charles Grant, Zachary Macaulay, William Wilberforce, Henry and John Venn, John Shore (Lord Teignmouth), Granville Sharp, and James Stephen. In addition there were certain "fringe" members, including Hannah More, Charles Simeon, Thomas Gisborne, William Smith, Thomas Babington and others. All of them exerted considerable influence in the social, political, and religious life of the nation.

The "Saints" owed much of their religious zeal to lessons they learned from the earlier Evangelicals, and the Claphamites were unashamed of this association. But there were certain areas of life where the "Saints" went beyond their predecessors in an effort to show that the message of Evangelicalism, to be most effective in its outreach, must be redemptive of the life of those helped, and in order to be redemptive must be intelligent and farsighted.

The Clapham Sect went beyond what had been done previously as they sought to apply Evangelicalism to the transformation of the Empire, and by so doing, they stood in contradiction to the charge that all Evangelicals were concerned solely with individuals. The second area where the "Saints" went beyond was in their efforts to transform the National Church as they shared in its corporate life. They labored to redeem and revitalize the existing Church. A third area of unique service was the Clapham concern for society, its problems and possibilities. The "Saints" sought to demonstrate that Evangelicalism offered breadth of interest as well as depth of experience. The fourth area where the Clapham Sect went beyond in their endeavor was in the realm of Christian Personality. They were living evidence that vital religious experience could live and prosper in an atmosphere of wealth, power, and culture.



Evangelicalism in the Claphamites reached the highest branch of society.

The common bond for the "Saints" of Clapham was Evangelical Christianity. Drawn, held, moved by religious convictions, they set out to work the ethics of Christ, as they understood those ethics, into personal, social, and political affairs. In their status as citizens, by their marked ability, by their spiritual zeal and their moral courage they rendered tremendous service in a variety of areas.

305 pages. \$3.81. MicA54-1616

#### CHRISTIAN EDUCATION IN THE LIGHT OF THREE THEOLOGICAL VIEWS OF MAN

(Publication No. 8241)

William Clifton Moore, Ph. D.  
Boston University School of Theology, 1954

Major Professor: Donald M. Maynard

**Problem and Limits.** The problem of this dissertation is to determine implications for the theory and methods of Christian education of the theological concepts of man in the liberal-personalistic views of Albert C. Knudson, in the neo-supernaturalistic views of Reinhold Niebuhr, and in the religious naturalistic views of Henry Nelson Wieman; and to indicate where in present day Christian education theory and practice in Protestant Christian Churches concepts are to be found coinciding with these implications.

**Procedure.** Major works of Knudson, Niebuhr, and Wieman bearing upon concepts of man are used to determine their views of what man is, what he ought to be, and how he changes. When the position of each is established, logical implications are deduced from each position for the theory of Christian education - its meaning and function, aims, scope, and importance; and for methods in Christian education - the general approach, the mood and ways of teaching, and the place of leadership. Then some of the major writings on Christian education are examined to determine where concepts coinciding with these implications are to be found in present day theory and practice.

**Findings and Conclusions.** These contrasting views of what man is, what he ought to be, and how he changes, indicate conflicting implications for the theory and methods of Christian education. They imply three different theories of what Christian education is; three concepts of how man is changed; and differing concepts of the relation of Christian education to the process of transformation. In Knudson's view the change (salvation) is a continuous divine-human process that takes place in and through the ordinary conscious and purposeful experiences of man - a process of growth and development toward the Christian ideal - and Christian education is the means to this end. In Niebuhr's view transformation takes place in those extra-ordinary moments of confrontation with God which come to man as God is revealed to him, and Christian education is not a means

of transforming life but a way of acquainting man with the revelation in Christ. In Wieman's view change takes place in the natural process of maturation as the creative situations of life produce, and enable man to realize, meanings and values.

In current theories of Christian education concepts coinciding with contrasting implications are found intermingled. The theory represented by Ernest J. Chave and Sophia Fahs is the only comprehensive theory consistent with a single view of man (Wieman's). The theories of George A. Coe, William Clayton Bower, and Harrison S. Elliott contain concepts that coincide with conflicting implications drawn from both Knudson's and Wieman's views. The position held over a period of years by the International Council of Religious Education (as interpreted by Paul Vieth) contains concepts that coincide with contrasting implications drawn from the views of Knudson and of Niebuhr. No current theory develops fully the implications of either Knudson's or Niebuhr's views.

In present day practice (as shown in curricula), Beacon Books in Religious Education (Unitarian) indicate concepts rather consistently in line with implications drawn from Wieman's views. Presuppositions underlying Methodist church school and leadership education materials indicate concepts primarily in line with implications from Knudson's views. Closely Graded Lessons indicate concepts coinciding with implications drawn from both Knudson's and Wieman's views. And the Presbyterian Faith and Life Curriculum contains concepts coinciding with contrasting implications drawn from all three views.

Conflicts are due primarily to the fact that the meaning and content of Christian education are based on one view of man, while the way in which Christian education is carried out is based on another.

304 pages. \$3.80. MicA54-1617

#### OLD TESTAMENT SACRIFICE IN THE LIGHT OF UGARITIC LITERATURE

(Publication No. 8242)

C. Stanley Thoburn, Th. D.  
Boston University School of Theology, 1954

Major Professor: Elmer R. Leslie

The purpose of this dissertation is to explore the place of sacrifice in the life of the people of Ugarit, as disclosed by recent archaeological discoveries of its literature, with a view to obtaining any further understanding of the institution of sacrifice in the Old Testament.

By way of background material a review is given of scholarship in the field, first in regard to the subject of sacrifice in general and Old Testament sacrifice, and second in regard to Ugaritic studies. Three works in particular serve as primary sources for the study of the Ugaritic texts: Cyrus H. Gordon's *Ugaritic Handbook* (1947), which gives the transliterated texts along with a grammar



and glossary, the same author's *Ugaritic Literature* (1949), which is his English translation of the previous work, and H. L. Ginsberg's translation of the longer Ugaritic poems in Pritchard's *Ancient Near Eastern Texts* (1950). Preference is given to Ginsberg's translation, but the merits of Gordon's are kept in mind and continuous reference is made to the transliterated original.

A review is made of the Old Testament institution of sacrifice. This does not aim to be original, but draws upon the standard works in the field. Then an original study is made of the Ugaritic literature with a view to its bearing on sacrifice. Following this the findings in regard to Ugaritic sacrifice are summarized, including Ugaritic sacrificial terminology, the priesthood, the place of sacrifice, the animals and materials of sacrifice and offering, the kinds of sacrifice, the motives of sacrifice, and the relation of sacrifice to morals. Space is also given to fertility rites, which occupy a borderline position between sacrifice and magic.

A comparison is then made between the two systems of sacrifice for similarities and differences. Points of similarity are as follows: The sacrificial terminology is very similar, illustrating what holds true generally, that there is a close linguistic bond between the Hebrew and the Ugaritic language. Animals and materials of sacrifice are practically the same. The general ends sought are similar. The relation of gifts to the altar is somewhat similar.

Both systems have two classes of priests. The general pattern of the temple is the same. Both religions appear to have had a nomadic background.

The differences are in the area of meaning more than in that of outward expression, yet these are of significance. Certain Ugaritic practices were prohibited in Israel, such as the cooking of a kid in milk, which appears in Ugarit as a fertility rite. Hebrew sacrifice is viewed as divinely appointed in contrast to an Ugaritic spirit of expediency. Hebrew sacrifice is also related to a blood-covenant, which is not evident in Ugarit. Petition to deity is more independent of sacrifice in Israel. A striking difference is the prominence of the holocaust in the developed Hebrew system. The Ugaritic literature used to be thought to contain a reference to the holocaust, but better understanding has removed the evidence. With the holocaust in Israel went a deeper consciousness of sin. No evidence was found in Ugaritic literature for a relation of sacrifice to psalmody, nor was there any refinement by prophetic criticism, nor probably the same degree of humility in the priesthood. The greatest difference, which sums up the other differences, is the difference in the idea of God, for Yahweh was awful in his holiness while the Ugaritic gods were very human in their sentiments. The paradoxical combination of a demonic element with a high standard of morality in the conception of deity is not found in Ugarit.

214 pages. \$2.68. MicA54-1618

## SOCIAL PSYCHOLOGY

### THE INFLUENCE OF AFFILIATIVE MOTIVATION AND SOCIAL SUPPORT UPON CONFORMITY AND ATTITUDE CHANGE

(Publication No. 8311)

Kenneth Ralph Hardy, Ph. D.  
University of Michigan, 1954

In an effort to deepen scientific understanding of the nature of social influence and the determinants of the beliefs of men, a group situation was designed to study the influence of social support and affiliative motivation upon conformity and attitude change. In this group situation, seven men were successively interviewed regarding their attitudes toward divorce and asked to publicly indicate their position on a nine-point graphic scale of liberalism-conservatism toward divorce. The first six men interviewed were confederates who reported standardized arguments and positions on the topic. The seventh man was the subject under study.

Two experimental variations were used to study the effect of social support, one in which all six men opposed the subject's position on the issue and one in which one man, the fifth man interviewed, supported the subject. The subject's position on divorce

was ascertained four to eleven weeks previously via a questionnaire containing the graphic scale and twelve Likert attitude statements, at which time a projective measure of affiliative motivation, the California "F" scale, and twenty-three personality self-ratings were also administered. Men high and low in n Affiliation were randomly assigned to the two support variations. The degree of conformity was assessed by changes in position on the graphic scale, and attitude change was indicated by differences in response to the twelve attitude statements made during the initial testing and again immediately following the social influence situation. Thirty-one college men (groups) were studied.

Theoretical considerations led to the following predictions:

1. Greater conformity and attitude change by those high rather than low in affiliative need. These predictions were not confirmed.
2. Greater conformity and attitude change under conditions of no support than conditions of support. The prediction for attitude change was confirmed at the .05 level, but the one for conformity did not attain statistical confirmation (P about .11).

Analysis of the interaction of support with a three-way breakdown of *n* Affiliation scores (which took cognizance of ambivalent feelings about affiliation) indicated both conformity and attitude change to be a joint function of social support and affiliative motivation. Those in the middle range of *n* Affiliation scores conformed most under both conditions, those in the high range conformed only under conditions of no support, and those low in *n* Affiliation conformed more in the partner variation. Less clear-cut, but similar results were obtained for attitude change, except that the middle *n* Affiliation group did not change when a partner was present.

The results are interpreted as follows. Those scoring high in *n* Affiliation are believed to have strong positive motivation toward affiliation and to be dependent upon others for attitude validation. These characteristics lead to conformity and attitude change where the group unanimously opposes the person, but not where the group is divided, since the criterion of social validity and the necessity to conform for group acceptance lose their insistency when the group is split. The middle *n* Affiliation group is conceived to be strongly motivated toward friendly relationships but fearful of rejection by others. Their anxiety about acceptance leads to a compulsive conformity even when they do not change their attitude. The low need group, relatively unmotivated for affiliation, tends to be oriented toward the content of the communications, and is swayed more when both sides of the issue are given some consideration.

This interpretation of the major results of the study is supported by evidence from other data collected in the study, and by consistency with results from other studies. The tentativeness and generality of the conclusions are discussed in the context of further research possibilities.

125 pages. \$1.56. MicA54-1619

#### THE EFFECT OF VARIATIONS IN MOBILITY NORMS UPON THE LEGITIMATION OF THE PERSONNEL DISTRIBUTION BY SUBORDINATE POPULATIONS

(Publication No. 8316)

Myron Judah Helfgott, Ph. D.  
University of Michigan, 1954

The research investigated the effects of variations in the possibility and conditions of mobility upon the satisfaction of subordinates with the placement of people in a social group.

A theory was presented from which it was predicted that, for a two-level, four-man group, subordinates would (1) in a no-mobility group approve of the prevailing placements; (2) in an individual (competitive) mobility group approve of the placement of other subordinates, and disapprove of the placement of superordinates and of their own placements; and (3) in a collective (cooperative) mobility group would disapprove of the prevailing placements.

The possibility was considered that these mobility

variations are analogous to certain strata in contemporary American society, and to whole society types. Previous research on these empirical types tended to support the predictions made for the no-mobility and cooperative mobility variations, but tended not to support the predictions made for the competitive mobility variation. The original theory was then revised from a theory of disapproval with the prevailing placements to a theory of dissatisfactions with the prevailing placements, and the latter theory extended to include considerations of the overtness of expressing dissatisfactions. The revised theory differs from the original theory by predicting that the competitive mobility subordinate will be dissatisfied with aspects of the prevailing placements, but will tend not to evidence these dissatisfactions in manifest disapprovals.

These theories were tested in an experimentally-controlled field situation. First-year Air Force Reserve Officer Training Program Cadets were organized into three subordinate populations, differing in terms of the possibility and conditions of mobility. Each subject was told that he was part of a four-man, two-level problem-solving team, and that he was a subordinate in this team. Each subject was given a problem, already partially completed, ostensibly by his other team members, and asked to complete the problem. After each subject was later told that his team had failed on the problem, each subject was asked to rate the performance of his three team members and himself, once on a private questionnaire, and again on a public questionnaire. These performance evaluations served as the operational definition of the disapproval variable. Each subject was also given five projective pictures, involving superordinates and subordinates.

The statistical analysis of the data collected in the experiment tends to support the revised theory rather than the original theory. It was found that (1) the no-mobility subordinates tend to approve of the prevailing placements; (2) that the competitive mobility subordinates tend to be dissatisfied with aspects of the existing placements, but tend not to evidence these dissatisfactions in manifest disapprovals; and (3) that the cooperative mobility subordinates tend to disapprove of the prevailing placements.

It was then concluded that the possibility of upward mobility tends to excite the dissatisfactions of subordinates with their own placements, that subordinates tend to be dissatisfied with the placement of other personnel when such placement necessarily interferes with the subordinate's upward mobility, and that the collectivization of the subordinate level seems to be a necessary condition for the manifest expression of these dissatisfactions.

Suggestions were made for further research.

129 pages. \$1.61. MicA54-1620



# ATTITUDE CHANGE AS RELATED TO CHANGE IN PERCEPTION OF THE GROUP NORM

(Publication No. 8328)

James Brownlee Lau, Ph. D.  
University of Michigan, 1954

In this study the dependency of attitude change upon change in perceptions of group norms and upon accuracy of initial perceptions is examined. The main assumption underlying the hypotheses is that psychological pressure to change is generated in individuals who learn they are in a position deviant from the majority of their group. Additional assumptions are made regarding the cohesiveness of the groups involved, and the relevancy of the minority issue to fraternities.

Three general hypotheses tested are that attitude change is a function of (1) the existing attitudinal position of the individual in relation to the majority of his group; (2) change in perception of the norm of the individual's own group, and (3) the accuracy of initial perceptions.

Each member of thirty social fraternities completed pre-questionnaires concerning his own attitudes toward minorities and his own perception of the house majority opinion. These survey data were presented to each house at "feedback" meetings. The majority position of the house regarding willingness to admit members of minority groups, and its position relative to other fraternities on campus were presented in chart form. A post-questionnaire was completed by the members of the house one week after feedback.

Predictions concerning the first hypothesis are supported: individuals initially unwilling to admit minorities made positive attitudinal changes more frequently in houses where the majority was willing to admit them than in those where the majority was unwilling. Also individuals who were initially willing to admit made negative attitudinal changes more frequently in houses where the majority was unwilling to admit than in houses where the majority was willing. Two manifestations of psychological pressure are noted: (1) the greater the initial discrepancy between the individual's attitudinal position and the initially perceived norm, the greater the tendency to change; and (2) the greater this perceived discrepancy the greater the tendency to make larger changes in attitude. The latter manifestation is significant only when individuals are moving in the direction of greater willingness to admit.

Support for the second hypothesis is found to be of higher significance in testing individuals moving toward a norm of greater willingness to admit than for individuals moving toward a norm of unwillingness.

For the third hypothesis, the principal findings are that (1) individuals who were unwilling to admit minorities and inaccurately perceived the majority of their house to be unwilling made positive changes in attitude more frequently than individuals who were unwilling and accurately perceived the norm of their house to be unwilling; (2) individuals who were willing to admit minorities and inaccurately perceived

the majority of their house to be unwilling more frequently made negative changes in attitude than individuals who were willing and accurately perceived the majority of their house to be willing. In the latter finding, the interpretation is advanced that the discrepancy between the individual's willingness and his perception of the house norm as unwilling was an indication of the projection of negative predispositions. 135 pages. \$1.69. MicA54-1621

# THE RELATIONSHIP BETWEEN PERSONALITY AND GROUP STRUCTURE: AS SEEN THROUGH ATTITUDINAL AND PERCEPTUAL REACTIONS TO DIFFERENTLY CONTROLLED GROUP STRUCTURES IN AN INDUSTRIAL ORGANIZATION

(Publication No. 8183)

Arnold Sherwood Tannenbaum, Ph. D.  
Syracuse University, 1954

Director: Dr. Floyd H. Allport

A great deal of attention has been paid to the problem of understanding the relationship between group and personality variables. Little experimental work, however, has been done which tests hypotheses dealing with the concurrent effects of both group and personality factors. The dearth of research in this area is probably attributable in part to the lack of a conceptual scheme which is capable of reconciling such apparently diverse levels of phenomena. The present research has been an attempt to apply F. H. Allport's Event Structure theory to this problem.

## Concepts, Hypothesis, and Design

Simply and generally put, the central hypothesis tested in this research stated that attitudinal reactions of an individual toward a group in which he is operating are in part a function of the interaction between his personality structure and the group structure. A more precise mathematical formulation has been developed to express this hypothesis:

$$A_O = 2\sum P_{1B} R'_{S \rightarrow B} - \sum P_{1B}$$

where  $A_O$  represents the intensity of an attitude toward a group (collective) structure,  $P_{1B}$  represents the potency of the individual's personality trends, and  $R'_{S \rightarrow B}$  represents the relevance-prime of the group structure to the respective trends.

This hypothesized formula was tested by setting up two experimental work programs within a large white collar organization. Each program included about 200 persons, mostly female. The programs were made to differ in terms of the way in which control (authority) was distributed within them.

Individuals were classified on the basis of scores derived through the above formula as to whether or not they were "suited" to each of the experimental

program structures. Operational hypotheses were then stated in which it was predicted that those subjects more "suited" to the experimental group structures in which they were placed would increase relatively more in favorableness toward the program.

The specific dependent variables included attitudes related either directly or indirectly to the experimental program structures. In addition it was hypothesized that the subjects' feeling of freedom and involvement in certain activities related to the experimental group structures would be a function of the scores derived from the above formula.

### Results

A sufficient number of predictions were borne out by the data to suggest the general validity of the hypothesized formula. The most consistent findings were with regard to those attitudes related directly to the program structures. More peripherally related attitudes did not yield as significant results. When the data for both groups were combined it was

found that persons "suited" to the program structures in which they were placed wanted their respective experimental programs to last longer, liked their programs more, were more favorable toward their programs, were more satisfied with their programs, and liked the other programs less than persons who were less "suited" to the program structures in which they were placed. Hypotheses concerning involvement in certain company activities and freedom felt in these activities, though not fully verified, were borne out within at least one of the groups either at the 5 or 10% level of confidence.

### Conclusion

The present results clearly indicate the desirability of simultaneously considering both group and individual variables in the prediction of certain social reactions. Event Structure theory appears to supply an appropriate means for reconciling within a unitary approach these diverse levels of phenomena.

290 pages. \$3.63. MicA54-1622

## SOCIOLOGY

### SOCIOLOGY, GENERAL

#### CULTURAL CLASSES IN A PLANNED COMMUNITY: A STUDY OF SOCIAL ORIGINS AND SOCIAL ACCOMMODATION

(Publication No. 7785)

George Albert Field, Ph. D.  
University of Pennsylvania, 1954

Supervisor: Dr. James H. S. Bossard

This study of a small planned community explored the emerging social structure in a new, simultaneously settled community, and examined the developing relationships between two cultural classes, identifiable by educational level and occupational type. Participant observation and formal interviews were used.

Although cultural class differences were recognized by the residents, there was no general agreement as to the precise status of individual families. Some families received substantially higher or lower status scores than others, but there was wide variation in use of criteria, and no general consensus as to status ranking. Criteria used in reciprocal ranking related to community activities, personality characteristics, permanence, integration into the community, and moral qualities. Interaction between the classes occurred on a casual or superficial level as a result of proximity, and on a deeper level at points where the values and interests of the two groups converged.

The initial experience of moving into a community

at approximately the same time and facing common problems caused a camaraderie to develop across cultural class lines, resulting in mixed-class clique groupings.

Most acquaintance patterns formed during the first year, and a study of patterns in this and an adjacent older community revealed that the range of acquaintance tends to reach a saturation point within two years. Thus the residents should be able to perform rankings within the range of their acquaintance patterns during the first and second years.

A large proportion of the social contacts made during the first year involved problems relating to the house, yard, and gardens. This factor operated within the environment provided by spatial and temporal propinquity.

After two years, the effect of moving in almost as a group had waned, and congeniality based on common elements in the backgrounds and personalities of the residents began to exert a stronger influence on associational patterns.

After the first year, the Fringeville population tended to revert to associational aptterns within cultural class lines to a great extent. This tendency was sharpened by value-evocative situations or incidents, i.e., situations that called forth latent and conflicting values in the two cultural groups.

During the third year, the general level of neighboring remains higher than in most crescive communities, though not as high as it was during the first year.

The marked strain toward egalitarianism noted in other planned community studies was also evident here.

289 pages. \$3.61. MicA54-1623



A COMPARATIVE ANALYSIS OF THE  
MARRIAGES AND FAMILIES OF PARTICIPANTS  
AND NON-PARTICIPANTS IN A COURSE  
IN MARRIAGE EDUCATION

(Publication No. 8257)

George Haas Finck, Ph. D.  
Florida State University, 1954

The purpose of this study was to test the basic assumption that participation in a marriage education course in college was a basis for the prediction of success in marriage. The general hypothesis was that, in terms of their marriages and families, participants in marriage education courses are prepared to engage more successfully in marriage and family life than non-participants. It was assumed that the contribution of this preparation could be objectively measured in terms of certain gross characteristics of the family configuration - getting married, staying married, and having children. It was recognized that to define "success" in marriage in these terms was to employ objective and easily evaluated criteria.

The specific hypothesis of this study was formulated in terms of the course in "Marriage and the Family" at the Florida State University between the years of 1930 and 1946. This specific hypothesis was tested by setting a series of substantive sub-hypotheses:

1. That participants marry in greater proportion than non-participants.
2. That participants marry at a greater interval after graduation than non-participants.
3. That participants marry at a later age than non-participants.
4. That the proportion of participants who marry husbands three to five years older is greater than the proportion of non-participants who marry husbands three to five years older.
5. That the number of years participants remain married is greater than the number of years non-participants remain married.
6. That the proportion of the participants whose marriages were terminated and who remarried is greater than the proportion of the non-participants whose marriages were terminated and who remarried.
7. That the interval in years between the marriages of the participants and the births of their first children is greater than the interval in years between the marriages of the non-participants and the births of their first children.
8. That the number of living children born to the participants is greater proportionately than the number of living children born to the non-participants.
9. That the proportion of participants who attempt to space their children is greater than the proportion of non-participants who attempt to space their children.
10. That the proportion of children adopted to the total number of children is greater among the families of the participants than among the families of the non-participants.

Questionnaires were mailed to all living four year graduates of the classes of 1932, 1933, 1938, 1939, 1945 and 1946. Of 1282 questionnaires mailed, 917 replies were received - 223 participants and 694 non-participants.

Very slight differences between participants and non-participants were indicated by the data. All the sub-hypotheses except #1 were rejected because of the direction of the difference between the means or because the differences were not statistically significant. On the basis of the rejection of the other nine sub-hypotheses, an alternative hypothesis for #1 was developed - that participants in a college course in marriage education are more predisposed toward marriage than non-participants. Both specific and general hypotheses were rejected.

It was concluded that: (1) the factors of difference between participants and non-participants that can be traced to the class experiences of a course in marriage education cannot be isolated in the areas examined by this study; (2) participating, or non participating, in a course in marriage education does not of itself determine certain gross characteristics of the family configuration and does not demonstrably modify the subsequent behavior of the participants in the direction of getting married, staying married, and having children.

163 pages. \$2.04. MicA54-1624

RURAL AND URBAN BACKGROUND AS  
FACTORS IN THE BEHAVIOR OF  
FACTORY WORKERS

(Publication No. 8330)

Charles Nathan Lebeaux, Ph. D.  
University of Michigan, 1954

On the assumption that rural culture can be viewed as a variant of folk culture, lying somewhere along the ideal folk-urban continuum, this study makes an exploratory investigation of the general hypothesis that people of rural background will behave differently from those of urban background. If there are important rural-urban cultural differences their effects should be observable in the behavior of persons even after such persons have migrated from the environment of original socialization. In this study the existence of rural-urban differences is investigated in a factory setting, by comparing the responses of rural south, rural north, and urban north background groups to various aspects of the factory situation.

For procedural purposes a number of operational hypotheses are derived from existing literature, predicting the direction of rural-urban differences in specific areas of behavior. It is noted that such specific predictions can, in the present state of knowledge, be made only with great uncertainty, and that their main purpose is instrumental to the exploration of the general hypothesis.

To test the hypotheses data were drawn from a study of the Caterpillar Tractor Company made by the Survey Research Center of the University of

Michigan in 1950. Various items on a questionnaire administered to the total working force at Caterpillar enabled the selection of groups of rural south, rural north, and urban north background, totaling some 5000. Other items were used to compare the groups on their responses to various aspects of the factory situation. The research design employed permitted control of the variables, age, education, pay and seniority, and also a significance test for the existence of rural south - rural north - urban north continua of behaviors. The effect of migrancy on the behavior of the rural groups was not controlled.

Results revealed a pattern of differences that is only partially explicable in terms of current conceptions of rural-urban culture difference. Divergence from expected behavior was particularly noticeable in the rural south group. While the rural background groups were, as expected, more satisfied with pay and chances for promotion than the urban group at significance levels beyond the .01, they were also, at an .07 level, more often union members. The rural south group was attitudinally the most favorable to the union. At non-significant levels, the rural groups felt that they had to work harder to get their work done, but were also reported by their foremen, on the basis of objective records, to have higher production rates. Beyond the .05 level the rural groups, compared to the urban, felt that they held the poorer jobs in the factory, but at the same time more often preferred to keep their present jobs. No differences among the groups were found on indices of overall satisfaction with the company, the foreman, and the job. Essentially similar results to the above were found in a comparison of the rural and urban north groups alone. There was some indication that differences between the rural and urban groups decrease with increasing length of urban experience of the rural groups.

Since the study was primarily exploratory in nature, conclusions are necessarily tentative. Interpretation of the results is attempted by an *ex post facto* formulation stressing the following elements: (1) persistent rural-urban culture differences exist in circumscribed areas, particularly in values with respect to work and production, (2) rural migrants to urban midwest factory jobs in recent years are not representative of the ideal type of rural migrant portrayed in the literature, particularly as regards their low social class origins and culture and the extent to which the "hillbilly" Kentucky-Tennessee variant is present, (3) behavior indicative of group conflict appears, especially among the rural southerners, and (4) rural persons in a working class urban setting consider themselves inferior because of their rural traits. Replication of the present study with other populations seems indicated as the next research step in order to corroborate results found here. 201 pages. \$2.51. MicA54-1625

## SOCIOLOGY: SOCIALISM, COMMUNISM, ANARCHISM

### PRACTICAL MORALITY TAUGHT TO SOVIET CHILDREN: AS ILLUSTRATED IN FOUR OFFICIAL SOVIET PERIODICALS, 1937-1951

(Publication No. 8337)

Richard Kramer, Ph. D.  
Columbia University, 1953

This dissertation represents an effort to evaluate the morality taught to Soviet children according to the norms of Scholastic philosophy. It also is an effort to organize Soviet ethics according to the categories of Scholastic ethics.

The consideration of the practical morality taught to Soviet children, consequently, begins with those virtues and duties which are related to the purpose of living, as Soviet moralists conceive it. These virtues and duties come down to an integral dedication of the intellect, will and emotions to the ideal, or cause, of establishing a communist society. The second class of virtues and duties, accordingly, are those related to the Soviet state. These are classified under the headings: Soviet patriotism, defense, the socialist attitude to labor, the communist attitude to social property, and proletarian internationalism. All of these are absolutely dependent upon the ideal of constructing a communist society as are all the elements of the morality taught to Soviet children. The next series of virtues and duties are those that Soviet children are taught with respect to others - their superiors: parents and teachers; and their equals. In this discussion a place is given to the morals of family life in the Soviet Union. Finally, the duties and virtues that Soviet children are taught to practice with respect to themselves and to God are treated. The former are grouped around duties with respect to preserving one's health, the virtues of temperance, and the duty of preserving one's good name and personal honor. The latter consists in the militant atheism which is, like all the rest of the morality taught to Soviet children, a necessary corollary of Soviet philosophy.

Soviet ethical theory is expounded next. It is broken into four divisions: the nature of man, the nature of human activity, the nature of ethics, and the end of human activity. Each of these divisions is then evaluated according to Scholastic ethical theory and then the whole thesis is summarized.

A bibliography for the guidance of readers is offered along with extensive excerpts from the four Soviet magazines studied. These are included in appendices which are referred to in the footnotes to the main text. 374 pages. \$4.68. MicA54-1626



## SPEECH — THEATER

### THE THEATRE OF BRANDER MATTHEWS

(Publication No. 8270)

Jack Earl Bender, Ph. D.  
University of Michigan, 1954

Brander Matthews was one of the most dominant dramatic critics in the development of American dramatic theory, and more than any other single individual was responsible for the transition of the American theatre from that of William Winter to that of the third and fourth decades of this century. The specific objective of this study in dramatic criticism is to examine in a systematic fashion Matthews' aesthetic of the theatre and the drama as well as his theory and practice of dramatic criticism.

The study is divided into three major parts, the first two being concerned with Matthews' theory of the drama in respect to function and form and the last being concerned with his attitude toward criticism. Thus, chronology is incidental to the relationship of the individual facets of an aesthetic of the theatre. Reference to the theatre of Matthews' era and to the critics of this theatre is but incidental to the main theme and is largely restricted to notes. Two major exceptions are made to this latter plan, however. First, an attempt is made in the introduction to indicate the nature of critical thinking pertaining to the theatre at the time Matthews made his appearance on the scene. And, second, in the discussions of acting and of subject matter, an attempt is made to indicate more clearly the nature of Matthews' doctrine when contrasted with that of Winter.

Matthews' theory of the theatre stemmed from two central tenets: (1) the theatre is a separate art in its own right, and (2) the drama is the true theatre. Although he recognized the relative values of the theatre in its visual and auditory stimulation of an assembled audience, the theatre which Matthews most strongly defended was that which by means of mimetic representation communicated "the best that is known and thought." Thus, the drama was not only "theatre," but "literature," and Matthews was the supporter of a drama which should entertain in the theatre and which was realistic in subject matter and truthful in character portrayal. His principal contribution to dramatic criticism was the doctrine that drama must be treated in terms of the theatre and not as a simple literary product. His own works reflected this doctrine and were a blend of historical criticism and subjective opinion.

Brander Matthews was both a force in the American theatre and a force in the development of a new method of dramatic criticism. If the theatres represented by William Winter and George Jean Nathan are radically different theatres, that of Matthews is representative of the transition between the two.

Moreover, if in serious dramatic criticism the drama is treated as an art of the theatre, it is done so largely because of the work of Matthews.

476 pages. \$5.95. MicA54-1627

### THE SPEAKING SITUATIONS WHICH BUTLER UNIVERSITY UNDERGRADUATE STUDENTS AND ALUMNI MEET WITH THE GREATEST FREQUENCY; A QUALITATIVE ANALYSIS OF THEIR SPEAKING ABILITY FROM THE POINT-OF-VIEW OF CRITICAL JUDGES; AND AN ANALYSIS OF COURSES IN PUBLIC SPEAKING OFFERED IN BUTLER UNIVERSITY BETWEEN SEPTEMBER, 1933 AND JANUARY, 1950

(Publication No. 8153)

L. Gray Burdin, Ed. D.  
Indiana University, 1954

#### The Problem

The purposes of this study were: (1) to determine the speaking situations met most frequently by currently enrolled Butler University students and alumni graduating between June, 1937 and June, 1946; (2) to ascertain the quality of the subjects' speeches; and (3) to analyze the curriculum in and teaching of Public Speaking courses offered in Butler University.

#### The Procedure

1. A check-list questionnaire was submitted to 1,378 participants to determine the type and frequency of speeches, the method of their preparation and delivery, and curricular implications. Replies were received from 723 participants.

2. Four hundred participants, selected on the basis of random choice, were each given twelve thoroughly shuffled cards bearing a key sentence from an actual speech. The subjects were permitted 15 minutes in which to organize their own speech from this material after which a two minute speech was recorded on an individual, unbreakable disc. To ascertain the quality of these speeches, each recording was then judged by three expert critics employing rating sheets.

3. An analysis was made of the teaching philosophy, curricular content, instructional staff, enrollment, and grading in courses in beginning Public Speaking from official University records.

#### Findings

Frequency of Public Speaking Situations. Among student participants, the most frequently experienced speaking situations were: instructing or giving infor-

mation to groups (including describing), making announcements, telling stories to young persons, presenting instructions, presenting facts, making motions, participating in conferences, and teaching.

Among the alumni, the most frequently experienced speaking situations were: instructing or giving information to groups (including describing), making announcements, telling stories to young persons, teaching, presenting instructions, presenting facts, handling questions or objections, and sales talks to audiences.

**Supplementary data.** Two participants of every three were taking their first course in Public Speaking, and a majority of all subjects felt such a course would be vocationally advantageous. Fear of speaking in public was a major deterrent to enrollment in Public Speaking and it likewise was the most sought and obtained value. A majority of all subjects who did not have a course in Public Speaking felt the need of such training. The most frequently made suggestions for course improvement were more impromptu and speaking experiences. The subjects who had taken a course in Public Speaking were inclined to speak with less written preparation than the subjects who had not taken Public Speaking.

**Evaluations by critic judges.** Students who had taken a course in Public Speaking were rated superior to other subjects in virtually all judged aspects of composition and delivery.

**Analysis of curriculum and teaching.** Most of the subjects in this study were taught under the philosophy of Humanism in classes in the Day Division in classes averaging 16 men and 8 women. Generally speaking, the curriculum and class procedure have met fairly well the speaking needs of students. Criticisms, however, of content and procedure indicate the need for some changes.

#### Recommendations

1. Make Public Speaking a required course for all candidates for the bachelor's degree.
2. Establish poise and confidence in the student.
3. Provide bountiful speaking experiences based on Public Speaking theory. More impromptu speaking experiences were especially desired by the subjects.
4. Relate class speaking experiences to text theory.
5. A preponderance of participants anticipated and received skill in arranging ideas. Continued emphasis should be given the theory and practice of speech organization.
6. Provide instruction on the speech to inform, story-telling, conference participation, and the rudiments of parliamentary procedure incorporating the methods of making motions.
7. Emphasize communicativeness and conviction in delivery.

165 pages. \$2.06. MicA54-1628

#### A BIOGRAPHICAL STUDY OF MISS LAURA JUSTINE BONSTELLE-STUART TOGETHER WITH AN EVALUATION OF HER CONTRIBUTIONS TO THE MODERN THEATRE WORLD

(Publication No. 8293)

William Luther Deam, Ph. D.  
University of Michigan, 1954

This paper is a biographical study of a well-known and controversial figure in the modern theatre world, Miss Laura Justine Bonstelle-Stuart. Miss Bonstelle is deserving of study for two reasons: first, her reputation as a "maker of stars" has given her a unique place of respect in the theatre profession; and second, her successful operation of a stock company after the period when stock was a popular theatre has given her national reputation. The reason for writing the study is twofold: first, the study is needed for a fuller picture of American theatre history; and second, the fragmentary and often inaccurate records left by Miss Bonstelle and other chroniclers needed to be collected in a single paper wherein errors in that material could be corrected and contradictions resolved.

The basic organization of this paper is chronological. All available records, such as legal documents, committee records, financial statements, inventories, business organization agreements, et cetera were collected and examined. Secondly, interviews, in person or by letter, were held with members of her companies as well as with friends and relatives. This process also included the collection of private letters, diaries, photographs, and personal scrapbooks. Finally there was a thorough consideration of her 'press' in the cities where Miss Bonstelle produced. This investigative process led to a decision to use Detroit, Michigan, her most permanent base of operation, as a model.

Results indicate that her popular reputation as "maker of stars" was deserved, but did not yield all the underlying reasons for her success.

The study indicated that Miss Bonstelle will not be regarded by posterity as a great actress, but that she was exceptionally well suited to acting in her stock companies. It also indicated the following: she was an excellent business woman in the theatre and knew virtually all anyone could know about the practical side of theatre, from box-office to backstage. She was well above average as a producer of stock, doing plays that most stock companies would not attempt. As a director, she was excellent and was trusted by Shubert, Brady, and others with their best "stars." But her greatest achievement and satisfaction in the theatre was as a "Teacher." She possessed an ability to sense talent in others and to nurture it lovingly, the results showing themselves in the number of actors, managers and producers (but primarily actors), who have credited her with a considerable share of their success.

As a woman she was sure of herself and trusted her own opinion more than that of others. She was determined and consistent in driving forward to her known goal. She was ruthless, harsh, sarcastic, and



hard-headed in dealing with her employees, but her time, ability, and consideration were entirely at their disposal, and underneath it all she prayed for their success. She was a deeply religious woman, trusting Spiritualism and Christian Science to supply her with faith and trust in herself and her ideals. She was idealistic and refused to admit failure. She

was dominating and energetic and a slave to her theatre. Among her friends she enjoyed great popularity, and in general society she was consistently the center of attraction.

The study clearly shows that she was a unique and major figure in modern American theatre.

236 pages. \$2.95. MicA54-1629

## ZOOLOGY

### A STUDY OF THE FOREST FLOOR ARTHROPODS OF AN OAK-HICKORY WOODS IN SOUTHERN MICHIGAN

(Publication No. 8275)

Kurt Karl Bohnsack, Ph. D.  
University of Michigan, 1954

This study was undertaken as one of a series of investigations of the biota of the Edwin S. George Reserve, Livingston County, Michigan. The major objectives of the investigation were to determine: (1) the arthropod composition of the forest floor fauna; (2) the variation in soil moisture and temperature throughout the year; (3) the floral composition of the 25-acre woods chosen for the study, and (4) whether there is a correlation of soil moisture and temperature and the flora with the population density and fluctuations of the soil and litter fauna.

Random samples were taken each month from April, 1949 to April, 1950 in five stations that showed differences in cover, elevation, soil, slope, and proximity to woodland borders. The samples measured 0.3 of a square foot and included the litter and the surface 3-inch layer of soil. Sixty-eight soil samples and sixty litter samples comprising a surface area of 18 square feet and five cubic feet of soil were examined.

Weekly maximum-minimum temperatures were recorded at two weather stations at the 2 1/2, 6, 12-inch soil depths, of the soil surface, beneath the litter, and 4 1/2 feet above the forest floor. Soil moisture was determined each week in five localities for the 1/2, 3, 6, 9, 12, and 24-inch soil layers. These data were averaged for each month and reproduced in graphs. A tree population and distribution survey, as well as a percentage frequency analysis of the herbs, was made in each collecting station.

A total of 146,549 arthropods, representing approximately 650 species, were extracted with a Tullgren funnel, 78,043 from the litter, and 74,506 from the soil. A number of undescribed species were collected and some not previously known from the United States are reported. The different groups of arthropods are discussed with reference to their abundance, species composition, monthly fluctuations, and importance in the forest floor community. A

tabulation of the species, and the months and strata in which they were collected is presented.

The following conclusions were reached: (1) The forest floor is a rather stable environment which harbors a tremendous number of arthropods - a yearly average of 78,400 individuals per square meter or approximately 317,360,000 per acre in the litter and surface 3-inch soil layer. The Acarina and Collembola accounted for 95.3% of the arthropods collected. (2) There was considerable variation in the horizontal distribution of the arthropods. (3) The soil populations were lowest in July and March, and highest in the spring and September and December. The litter populations were lowest in April, and highest in the fall and early winter. (4) Contrary to what other workers report, it is suggested that arthropods do not move downward into the soil during the dry months to seek more favorable moisture conditions. This study indicated that the surface soil contains the most moisture. (5) It is concluded that while there is some evidence that arthropods responded to changes in moisture and temperature, correlations are not uniformly apparent throughout the year; other factors, either intrinsic or extrinsic, or both probably operate to account for some of the fluctuations. It is also apparent that different arthropods respond differently to environmental changes, and that correlation studies should be pursued with individual species rather than with composite populations. (6) The influx of arthropods from other strata and from adjacent fields did not materially contribute to the increase in the fall populations. (7) Despite monthly fluctuations in population densities, the percentage composition of the major groups was remarkably similar for the spring and summer, and again for the fall and winter months. (8) Larger population densities per sample were found in areas bordering on marshes than in the upland and interior parts of the woods. Also, those areas characterized by a dense herb or shrub stratum had higher populations, on the average, than the more open, "grassy" areas.

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THE LIFE HISTORY AND ECOLOGY OF THE  
RED-BACKED VOLE, *CLETHRIONOMYS*  
*GAPPERI GAPPERI* VIGORS, IN MINNESOTA

(Publication No. 8282)

Robert Stearns Butsch, Ph. D.  
University of Michigan, 1954

The essential features included in this study are: 1) the analysis of some of the environmental factors controlling the local distribution and the activities of the individual and the population; 2) an evaluation of the efficiency of the methods used and their effects upon the individual and the population; 3) the attributes of home range and territoriality; 4) general behavior patterns.

Information was acquired indirectly through use of the live-trap and tracking in the snow, and directly by the observation of wild and captive individuals. The quadrat method of live-trapping was utilized. Five study plots were used and the largest (.5 acre) has been in operation for four consecutive years.

In this investigation it was found that centers of greatest population density shifted yearly and corresponded to yearly fluctuations in ground cover density. Populations were normally low in the spring and high in the summer and fall. Spring breeding populations consisted of the young of the preceding year which survived the winter. Major periods of activity occurred at sunrise and sunset. Temperature extremes affected time of activity. At low temperatures major activity occurred during the warmer period of the day and at high temperatures during the cooler portion. The average home range size of 71 individuals was estimated to .059 acre. Adults rarely shifted their home ranges and have been known to occupy the same area for more than one year. Sub-adults frequently shifted their home range location. Adult females and young adult males appeared to be uniformly distributed over the study areas. High local population densities appeared to be due to the extreme tolerance of adult females for younger individuals. Adult females maintained a small poorly defended territory about the home site. Adult males maintained a large vigorously defended territory. Territorial displays involving the use of the lateral glands are described. The homing instinct is well developed and is independent of age and sex.

General conclusions which are reached in the study are: 1) *Clethrionomys* is not evenly distributed throughout the forest but is most common in moist subclimax situations and ecotones where heavy ground cover occurs. 2) Local distribution appears to be controlled by the availability of free water rather than suitable food. 3) The population is dynamic and the emigration, immigration, or extirpation of individuals is of great consequence in the interpretation of home range and its attributes. 4) *Clethrionomys* is highly territorial and a pronounced sexual difference occurs in the manner of its expression.

161 pages. \$2.01. MicA54-1631

MONOGENETIC TREMATODES OF SOME  
GULF OF MEXICO FISHES

(Publication No. 8258)

William Jennings Hargis, Jr., Ph. D.  
Florida State University, 1954

This paper is a report of the ectoparasites (Trematoda: Monogenea) taken from 313 individuals of 49 species of fish from the northern Gulf of Mexico during the period September, 1951 to January, 1954. It constitutes a new locality record for all worms reported and is the first concentrated study of this group made in these waters.

A complete description of an effective mass-collecting technique and a terminology for many important structures are presented.

Forty-seven new species are described, and 27 previously reported species are discussed. *Gyrodactylus stephanus* Mueller, 1937, *Rhabdosynochus rhabdosynochus* Mizelle and Blatz, 1941, *Monocotyle pricei* Pearse, 1949, *Mazocraeoides georgei* Price, 1936, *Tagia micropogoni* Pearse, 1949 and *Pyragraphorus pyragraphorus* (MacCallum and MacCallum, 1913) Sproston, 1946 are redescribed from the type slides.

Nine new genera and two new subfamilies are proposed. The genera, by family or subfamily, are Diplectaninae, *Pedunculospina* n. gen.; Monocotylidae, *Neoheterocotyle* n. gen.; *Dendromonocotyle* n. gen. and *Loimopapillosum* n. gen.; Hexabothriidae, *Dasyonchocotyle* n. gen.; *Mazocraeidae*, *Clupeocotyle* n. gen. and *Gastrocotylidae*, *Scomberocotyle* n. gen., *Neothoracocotyle* n. gen. and *Amphipolycotyle* n. gen. The new subfamilies are *Dendromonocotylinae* (Monocotylidae) and *Axiniinae* (Microcotylidae). New combinations are made for *Metamicrocotyla cephalus* (Azim, 1939), *Pyragraphorus incomparabilis* (MacCallum, 1917), *P. eueides* (MacCallum and MacCallum, 1913), *Tagia otolithes* (Yamaguti, 1953), *Heteraxine oligoplitis* (Meserve, 1938), *Neothoracocotyle coryphaenae* (Yamaguti, 1938), and *Neothoracocotyle acanthocybii* (Meserve, 1938). Other new synonyms are *Ancyrocephalus chaetodipteri* Pearse, 1949, for *Tetrancistrum longiphallus* (MacCallum, 1915) Price, 1937; *Choricotyle reynoldsi* Frayne, 1943, for *C. cynoscioni* (MacCallum, 1917) Llewellyn, 1941; and *Thoracocotyle paradoxa* Meserve, 1938 for *Thoracocotyle crocea* MacCallum, 1913.

Aside from the above alterations many other changes are made in the taxonomy of the order. Some of these are: *Rhabdosynochus* Mizelle and Blatz, 1941, emend. is transferred from the subfamily Tetraonchinae to Diplectaninae Monticelli, 1903, emend. Monocotylidae Taschenberg, 1879, emend., its genera *Monocotyle* Taschenberg, 1878, emend. and *Heterocotyle* Scott, 1904, emend., and its subfamily Loimoinae Price, 1936, emend. are altered. *Discocotylidae* Price, 1936, emend. and one of its genera, *Tagia* Sproston, 1946, emend. are rediagnosed. In the family Monocotylidae *Pyragraphorus* Sproston, 1946, emend. of the subfamily Monocotylinae and *Axinoides* Yamaguti, 1938, emend. of Axiniinae

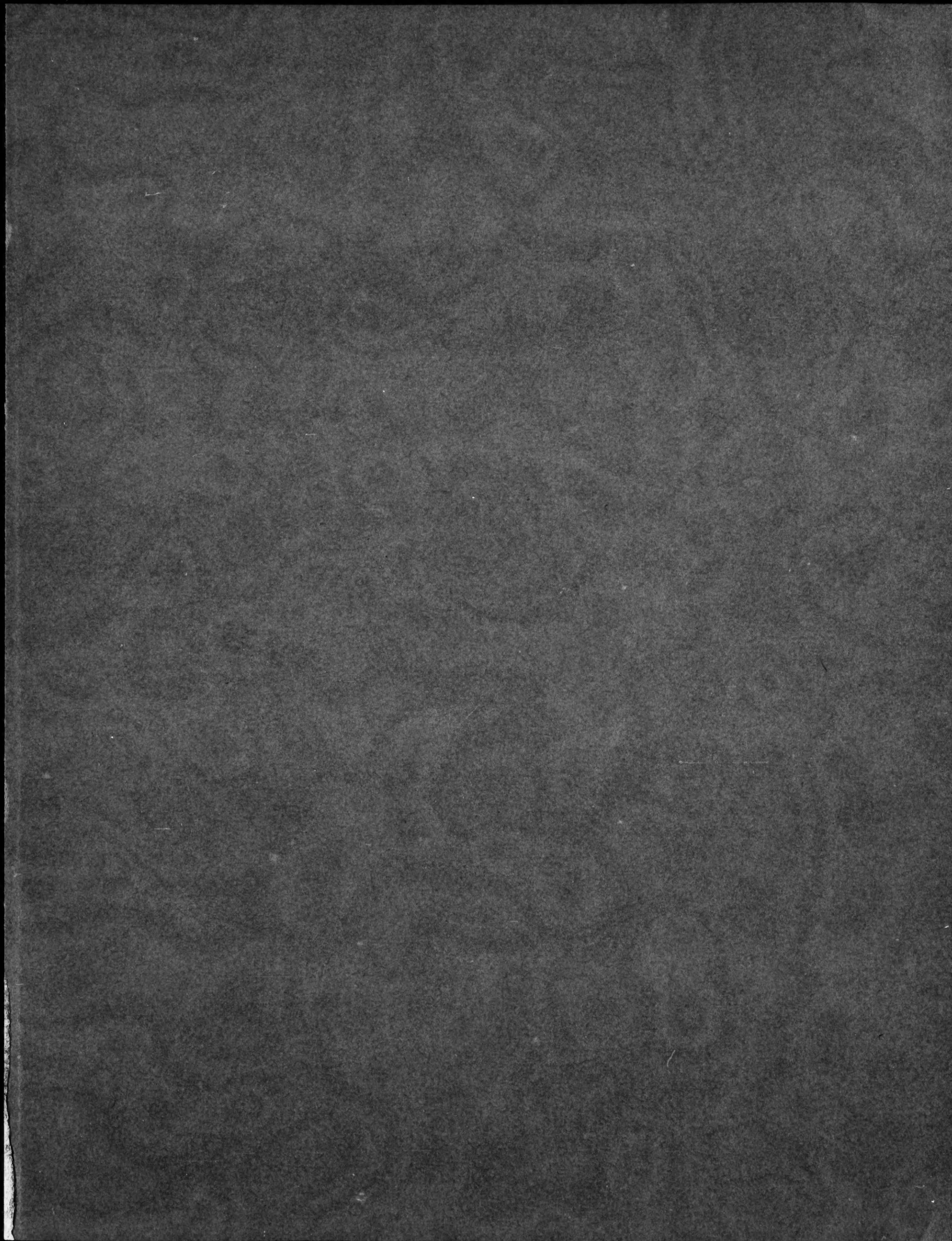


n. subfam. are emended. The family Gastrocotylidae Price, 1943, emend. is revived and diagnosed, it includes the subfamilies Gastrocotylinae Sproston, 1946, emend. whose genera Lithidocotyle Sproston, 1946, emend., Gotocotyla Ishii, 1936, emend. and Thoracocotyle MacCallum, 1913, emend. are transferred from the family Microcotylidae; and Vallisiinae Price, 1943, emend. whose genera Vallisia Perugia and Parona, 1890, emend. and Allodiscocotyla Yamaguti, 1953, emend. are transferred from the family Discocotylidae.

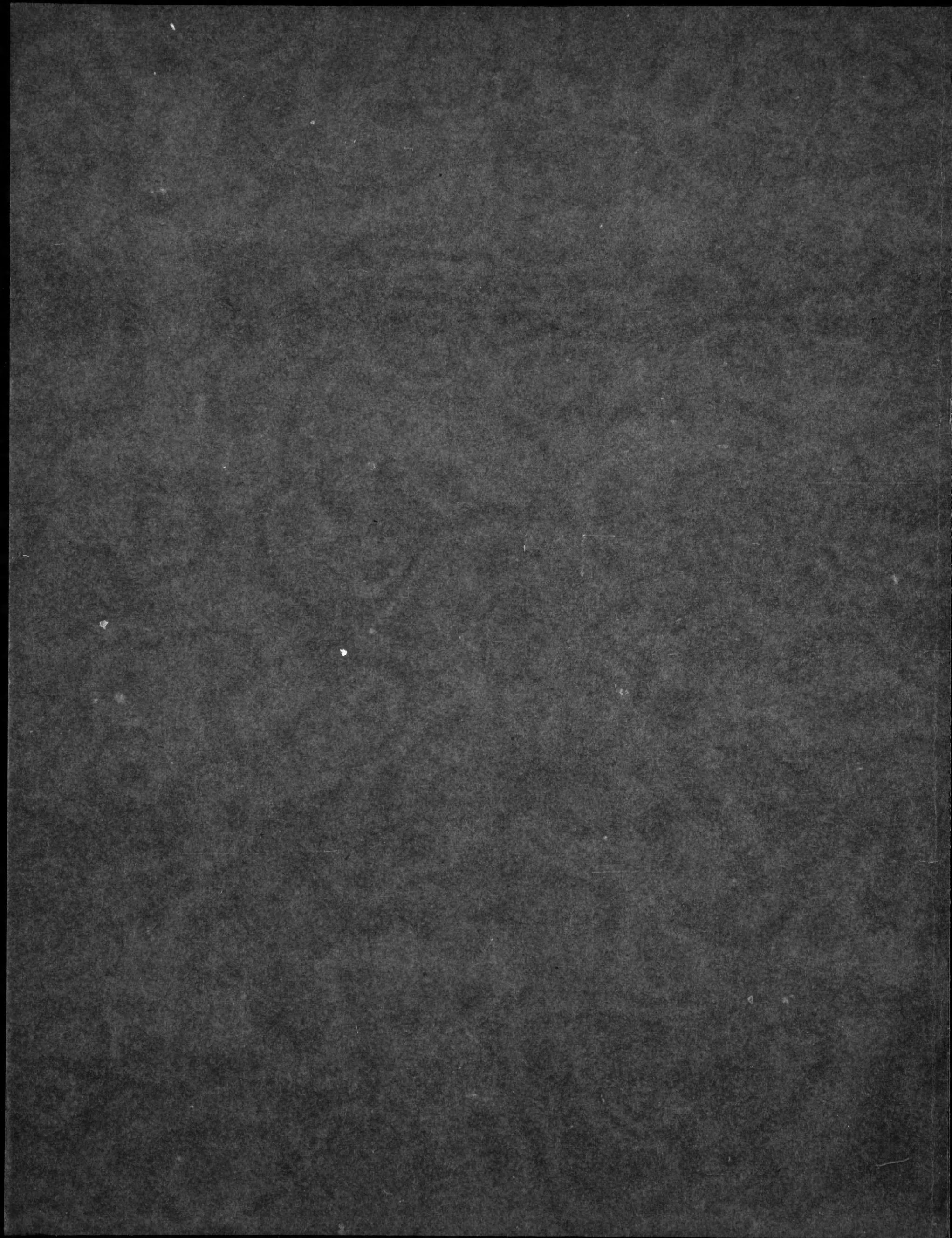
Sproston's (1946) idea that the clamp sclerites of Diclidophoridae are homologous to those of families whose clamps have been less modified is adopted and expanded. This provides the basis for the theory that the family Diclidophoridae evolved from a form similar to some Tagia spp. of the family Discocotylidae and that this evolution probably proceeded from the discocotylids through the diclidophorinids to the choricotylinids. In addition, the hypothesis that Pyragraphorus evolved from Microcotyle is proposed.

Monogenetic host-specificity is considered. This has necessitated the proposal of two basic terms, species-specificity and supraspecificity. The fact that very striking host-specificity exists in naturally occurring monogenetic trematodes is confirmed and an attempt is made to understand its limits and some of the factors causing it. This attempt, while yielding some interesting information, results in the conclusion that much study remains to be carried out before host-specificity will be clearly understood. It is suggested that a study of the monogenetic fauna of fishes may throw light on the phylogeny of the fishes themselves, and vice versa. Caution in such application is urged. Species-specificity at all of its levels appears to be more rigid in marine habitats than in the more confined freshwater habitats. It is concluded that supraspecificity may involve ecological and phylogenetic considerations.

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**DISSERTATION ABSTRACTS**

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